1983

The Faculty evaluation system

Peter Weiler
The University of Montana

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

The Faculty Evaluation System

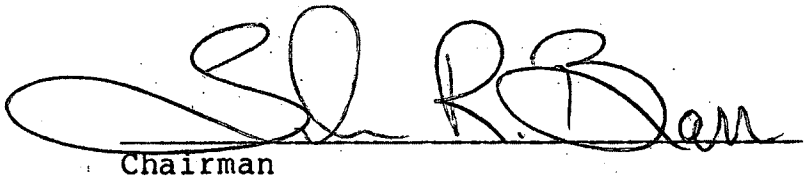
by Peter Weiler

Presented in partial fulfillment of the requirements for the degree of Master of Science

University of Montana

1983

Approved by:



Chairman

Dean, Graduate School

6-10-83

Date

Weiler, Peter P., M.S., June 1983 Computer Science

The Faculty Evaluation System (268 pp.)

Director: Dr. John Barr

The faculty evaluation system was developed to be an automated aid for evaluating faculty. The instructor submits a request for questionnaires. Questionnaires are printed on Scantron readable forms. The forms are read by a Scantron card reader and the results of the questions are interpreted to produce reports.

The evaluation system was designed by using all of the phases of development for a large software system. The specifications and requirements of the system were approved by the thesis committee. A logical design of the system was then developed. The logical design consisted of data flow diagrams and PSL/PSA reports describing the diagrams.

The programs were written according to the specifications and followed very closely the structure set up by the logic design. The programs were tested mostly under actual operation conditions. All of the programs were found to operate according to the specifications set up for them.

In closing problems encountered in developing the system and recommendations for future software projects are discussed.

SB

Table of Contents

List of Figures

Introduction

The faculty evaluation system was developed as an automated aid for evaluating faculty. The system allows the evaluations to be processed at a central location by data entry personnel. The system was set up and documented to allow unexperienced data entry personnel to use the system. The user's manual and the system manual are described in appendix A and appendix B respectively.

The faculty evaluation system is composed of three parts. The first part reads in the information on the instructors that is needed to produce questionnaire forms. The first part of the system produces the questionnaire forms on Scantron readable cards. The second part of the system uses a Scantron card reader to read in the answers to the questions and generate statistics about them. A report for the instructor and the faculty evaluation committee is then produced showing the results of the questionnaires. The instructor receives a report on both the general questions and on the questions that he picked from the data base. The faculty evaluation committee receives a report

with only the results to the general questions. The third part of the system is a maintenance program for the question data base and the standard questionnaire form data base.

The requirements for the project were developed by prototyping the system and discussion with members of my thesis committee. The final draft of the requirements and specifications were the bases for all of the future development.

The development of the system is then discussed. This consists of the logical design (appendix C), the program documentation (appendix D), and the programs (appendix E). The logical design consists of data flow diagrams and PSL/PSA formatted problem statements which describe the data flow diagrams in detail.

The faculty evaluation system was tested mostly under actual operation conditions. The programs were tested to see if they matched the requirements and the specifications. The complete system performs all of the items described in the requirements and specifications.

In closing some of the problems that were encountered in developing the system will be discussed, along with a summary of the system and recommendations for future projects.

The Faculty Evaluation System

The faculty evaluation system is being used by the university because a collective bargaining agreement between the University of Montana Teacher's Union and the Board of Regents requires that there be some method of evaluating faculty. Each faculty member is rated as to how well he performs in the following categories:

Research

Public Service

Teaching - The faculty evaluation will measure this.

The faculty evaluation system creates a questionnaire with 10 general questions and up to 23 private questions. The 10 general questions consists of seven demographics questions about the students taking the course. The other three general questions are used for evaluating the instructor. The 23 private questions are chosen by the instructor from a data base of questions.

The faculty evaluation system has some other benefits besides being required. The system is used to aid teachers in the development of their teaching abilities. Each instructor is ensured that only he will see the results of the confidential questions. The confidential results will allow the instructor to ask questions that will provide him with feedback that will benefit him. By selecting appropriate questions from the available data base the instructor can obtain ideas on how to improve his teaching.

The faculty evaluation system will aid the faculty evaluation committee by providing standard reports. The committee will use the global questions to make general personnel decisions, deciding, for example, if a faculty member should be promoted. The global questions will also provide information on what the students think about the course.

The faculty evaluation system is composed of three basic parts: production of instructor questionnaire forms, generation of the reports on the answers to the forms, and maintenance of a data base of evaluation questions and standard questionnaire forms.

The first part of the faculty evaluation system produces the evaluation questionnaires. The various departments on campus receive a list of all the questions in

the data base and a copy of all of the standard forms. The instructor then chooses the questions that he wants on his evaluation form. If a department is using the same questions they can request that a new standard form be created for them. If the instructor wants to have additional questions on his evaluation form he can write the questions on his question request form and they will be added to the question data base.

The department ,or instructor, turns the question request forms into a central location where the information on the forms is entered into the instructor data base. The routine to enter the instructor information into the instructor data base allows the data entry personnel to add an instructor record, delete an instructor record, or print a list of all of the instructor records that have been printed to date.

The questionnaire forms are printed at the end of the quarter. The routine that prints the forms only submits a limited number of the questionnaires at a time to keep from overloading the line printer queue on the system. After a questionnaire form is created for an instructor record a flag is set in the instructor's record to ensure that only one set of forms will be printed for any single instructor record each quarter. The program that creates the questionnaire forms from the instructor records also creates

a print command file for printing the questionnaires with the appropriate switches. The main reason for having the print commands file is so that the number of copies of the questionnaires can be set by the spooler queue instead of having to create a very large file with multiple copies. This was set up to save disk space on the system. If we could write directly to the lineprinter with forms control it would be better to create the large files.

The questionnaire forms are a special form which can be read by a Scantron card reader. The ten demographic and global questions that will be used by the faculty evaluation committee are preprinted on the forms. The forms also have preprinted marks on them so the user will mark the correct spots on the card so a Scantron card reader can read in the answers.

The questionnaire forms are passed out in the instructor's class at the end of the quarter. The answered forms are then returned to a central location so they may be interpreted and have reports produced from them.

The answered questionnaires are fed into a Scantron card reader along with a header card identifying the department, course, and section number for each questionnaire set. The card reader will read the answers off of the cards and place the results into a file on the

computer. The data entry person entering the questionnaire answers will then run a program that will compute the frequency, mean, and standard deviation of the questions for the instructor, as well as a brief summary of the level of student consensus on each question. The statistics for each instructor record are placed into separate files that will be used for report production.

After the user has created a number of statistics files he runs a program that will produce the reports for the instructor and for the faculty evaluation committee. The report for the faculty evaluation committee contains only the ten preprinted demographic and global questions. The report for the instructor contains the results of the ten demographic and global questions as well as the results of his picked questions. The report program generates an error message if it cannot find a unique instructor record in the data base or when it cannot match the identification record that is at the beginning of the statistics file. The data entry person then has to correct the errors or run the program and enter the instructor's name as the additional information to make the instructor record lookup find a unique record.

The reports are generally produced at the beginning of the quarter following the evaluation. The reports are passed out so that the material remains confidential.

The third part of the faculty evaluation system has been mentioned briefly already. It is the program that maintains the questions and the standard forms. This program allows the user to add, edit, and delete questions from the data base. The routine will also print out a list of all of the questions in the data base. The program also adds and deletes the standard forms from their file. The program uses the questions in the question data base to create copies of the standard forms when the user chooses the option to print all of the standard forms.

The faculty evaluation system was designed to be easy for the user to operate since people inexperienced in the use of computers would be using it. The programs were set up to trap all of the errors that I could think of and that the user could make. In all of the programs the input is parsed so an invalid entry will not cause the program to fail.

System Requirements

The faculty evaluation system is a means for evaluating faculty. The system will generate questionnaires to be completed by students in each of the instructor's classes. The results of the questionnaires will then be evaluated and copies of the general questions will go the the faculty evaluation committee and the instructor. The results of a list of instructor picked questions will go the the instructor only.

Question Requests:

Each instructor that is using the faculty evaluation system will have the first ten questions of the evaluation questionnaire generated automatically. These questions consist of two types of questions. The first seven questions pertain to demographic questions about the students. The next three questions are to obtain general information about the instructor.

The instructor has the option of adding up to 23 additional questions to the questionnaire by picking questions from a given list of allowed questions. The instructor can also pick a standard form as his additional questions. The standard forms contain questions from the list of allowed questions. The list of allowed questions consists of a set of questions purchased for the reason of evaluating faculty and questions added by departments and instructors.

Questionnaire Generation:

The information about each instructor and the questions that he is using will be used to print out the instructors requested number of forms. The questionnaire forms will be printed on a special form that can also be fed through a Scantron card reader. The ten questions referenced above will be preprinted on these forms. The questionnaires will then be distributed to the instructor's to be passed out to the students at the end of the quarter.

Report Generation:

The questionnaire answers will be entered into the computer by the Scantron card reader along with the general information on the instructor. The questionnaire answers will be converted into statistics to be used in generating the reports. The statistics generated will be a frequency

of the occurrence for each answer to each question, and the mean and standard deviation for each question.

Reports will be generated that will use this information and the information about the instructors. The reports will list the general questions and the questions that the instructor picked. The reports will list the frequency of occurrence for each answer to each question and the mean and standard deviation of the answers for each question. The report on the general information and the demographic questions about the students will go to both the instructor and the faculty evaluation committee.

Program Maintenance:

There will be a automated method for updating the list of questions and the standard forms. There will also be a method used to print out the list of questions and the standard forms.

Developing the Faculty Evaluation System

The faculty evaluation system has undergone considerable changes since I started work on it. The initial faculty evaluation system was purchased from the University of Illinois as the ICES (Instructor Course Evaluation System)[1]. This system was written in COBOL and designed to run in batch mode on an IBM machine. The initial project was to install the system on the University of Montana's DECsystem_20. After considerable effort in trying to modify the programs so that they would run on the DECsystem_20, I came to the conclusion that it would be easier to write a system of my own instead of trying to set up the ICES system.

The first part of the project that was to become my thesis was to model the ICES system. I used data flow diagrams[2] to understand the different parts of the system. The data flow diagrams were described in detail by using PSL/PSA[3,4,5]. By using PSL/PSA I generated reports[6] to describe the different data flow diagrams in detail. The reports produced by PSL/PSA were the basis for the data

structures and program structures that I used in the evaluation system.

The second step in the thesis project was to develop a logical model of the ICES system. By doing the logical model I found that there were a lot of routines that we did not need in the system. A major difference in installing the system on the two computers was that the IBM machine was run in batch mode whereas the DECsystem 20 was run in interactive mode. The logical model gave me an indepth understanding of the components of the evaluation system.

There were some problems in creating the models using PSL/PSA, since nobody had any knowledge about how to use the automated design aid. This problem was overcome by doing a lot of reading and trial and error[7,8].

At this point of development of the thesis a problem arose. The system had to be operational by the end of the quarter which was only two weeks away. At this point the only programs that were working from the ICES system were the ones to create the questionnaire forms and the instructor data base. I set up what was to be a temporary system to read in the Scantron cards and create statistics files. I also wrote a program to create the reports for the instructor and the faculty evaluation system. The report program used the same data structure as the original ICES

system. The Scantron cards that we were using were roughly the same as the cards used by instructors in giving tests, with one difference. The Scantron cards that we used were printed poorly so only one in four cards was being read. A lot of the questionnaires had to be rewritten onto good forms and run through again.

The temporary programs that were developed were not just thrown together. At the time that they were written I had a complete knowledge of how the system worked and what kind of reports should be generated. The programs had a very short design phase and were written using an incremental development mode. Each piece was then tested separately and the routines were set up for a data entry person to use with me doing some heavy consulting in the initial operation of the programs.

Once the pressure was off I started working on the project following the "normal" software life cycle. I spent a considerable amount of time in writing the requirements and specifications for the system. There had been a number of changes in how the complete system should operate and they had to be resolved before the project could continue.

After the requirements for the faculty evaluation system were accepted there were enough changes in the overall system to require that it be redesigned. I used

data flow diagrams and PSL/PSA reports to define the final evaluation system (see appendix c). The logical design for the system that I developed was tailored closer to what our university needed than the original ICES system had been. In the new system the instructor record was defined to include only the information that we needed. The questions were then altered so they could be printed easily on a special Scantron form.

At this point once again programs were needed so that the instructor information could be entered before the end of the quarter. I spent several weeks studying different languages that could be used in developing the system. The original Scantron interpreting routines were written in FORTRAN. Since FORTRAN is a supported language I studied the possiblity of writing the programs for the system in FORTRAN. There was one major drawback to using FORTRAN. FORTRAN does not have a dynamic method of allocating storage so a lot of the structures would be very sparsely used most of the time.

Another possible language to use was COBOL. This language was discarded because of the difficulties in file handling and in structuring the code.

The language that I spent the most time studying was 1022 data base programming language. This language would allow me to write trivial programs to generate the reports that I needed. There were several drawbacks to this language. The most notable drawback was that nobody new enough about the language for me to do the file handling that needed to be done. The 1022 data base language is difficult to use when you want to access multiple files.

The language I chose to write the system in was Pascal. The only major drawback to this language was that it was not supported on our computer system. Pascal had all of the data structures that I needed to allow dynamic storage and structured records and programs. Pascal also had all of the file handling operations that I need for the system.

With the logical design of the system I developed the programs to enter in the instructor records and to print the questionnaire forms (appendix E). I had previously developed the program to maintain the question data base and the standard forms (appendix E). In developing the programs the requirements and the logical design aided greatly in understanding what needed to be done and how it should be implemented.

After all of the programs were written I settled down and started writing manuals on how to use them (appendix A and appendix B). The manuals describe in detail how to use the programs and how to use the entire evaluation system. The manuals also discuss the error messages that the programs produce for invalid data and methods of correcting errors.

The last step of my thesis project was writing up a design document for each program in the system (appendix D). This document helped refresh my memory on how I implemented several routines and left me with some possible methods for improving the system. The design document describes in detail all of the procedures in the program and how they interconnect. The document also discusses the flow of data between the procedures. The design document would be a excellent aid for reimplementing the system in some other block structured language.

Integration and Testing

The faculty evaluation system was tested under actual operating conditions. The routines were set up and checked to see if they were free of most of the errors. The data entry personnel were then allowed to use the programs. There were relatively few errors found by the data entry personnel.

The routines were set up in three basic groups: the questionnaire generation routines, the report generation routines and the questionnaire maintenance routines.

The report generation routines were the first set of programs written. The initial versions of these routines were used to print the reports from the data bases created by the original ICES system [1].

The statistics routine in its original version read information from scantron cards that instructor's were using for courses. There was an error in reseting the statistics values that was corrected at a later date. For the second quarter of use a different set of forms were used. There

was some initial problems in changing the program to operate with the new forms. As of the current date the statistics routine is generating all information correctly. Some results were checked by hand to verify this. The statistics routine is also generating all of the statistics that were specified in the system requirements.

The report generating routine was also set up to produce reports using the original ICES files. The report routine prints two reports, one for the instructor of the course and the other for the faculty evaluation committee for the department the instructor is under. This routine had some errors in printing the results from the statistics because the statistics were not being created correctly. Once the statistics routine was corrected the report program ran without errors for the rest of the quarter.

For the second quarter of operation the statistics routine had been creating the statistics incorrectly because of the change in forms. This error caused invalid reports to be printed. Once the statistics file was changed to correct for the new forms the report program was again producing reports correctly. Some of the reports that the report program produced were checked by hand to insure that they were being produced correctly. The reports that were sent to the instructors when all of the routines were running correctly were never reported to be in error.

The complete report generating programs are currently running without any apparent errors at this time. For proof of correctness I can only say that at this time with the current routines that are being executed no error has been found. The routines have run for a complete quarter and there is no evidence that they will fail in future quarters.

The program that was created next was for editing the question data base and for entering standard forms. The program was initially set up to change the questions that came with the original ICES system. The questions were all changed so that they all would use the same responses for the answer to the question. After the program was set up data entry personnel began using it to update the question list. By printing out the updated list of questions and checking them against what was entered no errors were found.

Routines were then added to the program to add, delete, and print the standard forms. These routines were also put into immediate use with a data entry personnel operating the program. The program was checked to see if the standard forms were being generated correctly by online use. There were no errors reported from the instructor's that used the standard forms.

The last set of programs installed were the routines for creating the questionnaire forms for the instructor. The first program is used to generate the instructor data base. The second program is used to generate the questionnaire forms and to create a print command file to print the forms.

The program to create the instructor data base was installed for use and the data entry person entered an invalid entry which was not correctly handled by the program. The program was then changed to parse all of the input that was entered so that it would print out an error message and have the user reenter the value. The program was set up to add, delete, and print the instructor records. The program had another error that caused the loss of a lot of instructor records. The routine was writing to the output file and then reading the information back in after ten modifications had been made to the data base. The problem with backing up the data base using this method is that Pascal keeps the file pointer to the input file pointing to the original file not to the updated version. This error caused the system to read in the information from the wrong version of the instructor data base file. This error was corrected late in the last quarter that this routine was used. The program appears to be running correctly as of the current data and allows the user to

perform all of the tasks specified in the requirements document.

The program to generate the questionnaires and create the print command file was set up without any apparent errors. A hidden error was found immediately upon running the print commands file. The print command routine submitted about 550 jobs to the line printer within a matter of minutes. The massive amount of print requests that then occupied the printer queue caused the line printer to freeze up. The operator was getting an extremely slow response when she tried to look at the queue. The print jobs all had to be cancelled before any more problems happened to the system.

The problem that was encountered in submitting all of the questionnaire forms for printing at once was corrected in a later version of the program that has yet to be fully tested. In this version of the program at most 100 print requests can be submitted at any one time. The routine changes a flag in the instructor's record to signify that the instructor's questionnaire forms have been printed. The reason for creating the print commands file was to automatically set the number of copies of forms to be printed instead of creating one large file with multiple copies of the form. The tests that have been run on this routine show that it is running correctly for the given

input.

The complete faculty evaluation system has only been tested in parts up until the current quarter. All of the separate parts appear to be working as specified in the requirements specification.

Problems and Recommendations

In doing my thesis I encountered a number of problems that considerably lengthened the time it took me to complete my thesis. These problems could be eliminated for the most part in future thesis projects. One of the main handicaps that I had was that I was the first one through our program and as such there where no clear guidelines to follow for doing my thesis.

I was also in the dark most of the time as to what steps I had to do to continue in an orderly fashion on the project. In the future I strongly recommend that the person writing the thesis have a good understanding as to the steps to take in developing the software project. There should be some criteria as to the quality and the completeness required for each phase of development of the software project. I spent considerable time rewriting things because I did not understand what was required when I started.

The part of the project that caused most of the set backs was the changing of the specifications of the system. After the system was running for one month we found a lot of things that had to be changed to make the system run a lot smoother. The changes forced the system to be redesigned and some of the old programs partially rewritten. For this project I felt that all of the changes were for good reasons and necessary to the complete system.

The initial set up of the system was a prototype of the complete system. The prototype was developed to determine how the system would work. After the system had been running we knew enough on how to improve the evaluation system for running on the university's computer and for our users.

Another problem that I encountered was using Pascal on the system. Our version of Pascal is undocumented. I had a number of routines that failed because of the way our Pascal compiler worked. If at all possible the next thesis writer should use a language that is both transportable and has documentation written for it.

At this point the reader may wonder why I used Pascal instead of some other documented language. I used Pascal because of the dynamic storage structures that it allows and so I could write structured code. I had studied several

languages that could be used for the project and because of the structuring and the file handling capabilities I chose Pascal.

There were also a couple of minor problems that I had with the system that I never thought about. The questionnaire generating routine, the statistics routine, and the report routine all create a large number of files. There are some limits on the DEC20 as to the number of files that can be placed in any one directory. Also, when directories have a large number of files in them, some commands take a long time to execute.

I solved this problem for the most part by having the programs write the files that they were creating to subdirectories. This correction left the main working area free of all temporary files. The main directory was left with the executable versions of the programs and the data files needed to create the reports.

I inadvertently found another problem with our computer system. The routine that generates the questionnaire forms also creates a command files to submit the questionnaire forms for printing. When I executed the command program for the first time I overloaded the lineprinter queue on the system. I had to change the program so only a maximum of 100 forms would be sent to the print queue at any one time.

Summary and Conclusions

The faculty evaluation system was designed and implemented to aid in the evaluation of faculty. The system was set up so that the evaluations could be tabulated in a single area instead of having each department form a student committee to tabulate the results. The system was also set up so that instructors could choose a wide variety of questions and improve their teaching by the feedback.

The system was implemented after extensive modeling of the old system was done. The system was then redesigned and implemented after a quarter of testing. The current system is set up so that it can be easily changed as new ideas are presented.

The project was very close to a project done in industry. The only difference being that this system probably has better documentation and a lot more time went into this design than into a normal business system. The project helped me a lot in writing a program system that had to be used by data entry person and which therefore had to be user friendly.

In conclusion, I have several recommendations for future projects of this nature. The project should be set up so the developer does not have to rush the code and has time to go through all of the program development stages before the code is written. The researcher should also be told exactly what was expected in the way of documents for each of the stages of development.

The final program system should have the documentation and quality of a professional software project. In my project I learned a lot about interfacing a program to a specific user. The researcher should make sure the requirements and the logic design are done to the specifications of the customer or project head. This will save a lot of time in redoing code and designs.

The faculty evaluation system could have been written better if I followed all of the steps in developing a program system in the proper order. I would not have had to rewrite the programs for the statistics and the report programs if the data structures had been completely known when I wrote the programs.

The program system uses a lot of what I learned in the graduate level courses on writing programs. All of the programs are very modular and there is a minimum of connectivity between the different procedures in the

programs. The system was developed in an incremental design format. This design format allowed for additional features to programs to be added easily and for the programs to be tested and debugged in easy to manage sections.

The complete project was an application of what I learned in the graduate courses. The courses gave me additional insight on how to go about developing software and produce better quality code.

Bibliography

1. Instructor Course Evaluation System,published by the University of Illinois at Urbana-Champaign,1977.

2. Demarco, Tom, Structured Analysis and System Specification,New York, Yourdon inc.,1978.

3. Weiler, Peter, PSL/PSA a Computer-Aided Design Method,University of Montana, unpublished paper,1982.

4. Problem Statement Language (PSL) Introduction and User's Manual,published by the University of Michigan, Ann Arbor, 1977.

5. Language Reference Manual Problem Statement Language (PSL), published by the University of Michigan, Ann Arbor, 1981.

6. Problem Statement Analyzer (PSA) Reports and Report Commands, published by the University of Michigan, Ann Arbor, 1979.

7. Problem Statement Analyzer (PSA) Command Reference Summary, published by the University of Michigan, Ann Arbor, 1981.

8. Problem Statement Analyzer (PSA) Modifier Commands, published by the University of Michigan, Ann Arbor, 1981.

APPENDIX A

USER'S MANUAL

Create Questionnaire Forms

The routines to create the instructor questionnaire forms should be run from about the middle of the quarter to the end of the quarter that the forms are for. This will give ample time to produce all of the reports from the previous quarter. If any questions are to be added to the question data base they should be entered before the information on the instructors is entered. The routine to enter questions will be discussed later in this manual.

Before the user starts entering the instructor information for the current quarter the instructor information from the previous quarter should be deleted. The reason for this is a lot of classes have the same course

and section numbers each quarter and this could cause troubles when producing the reports. To delete the previous quarter's information type:

@DEL INST.SRT

@DEL INST.RPT

It is important to note that all of the reports for the previous quarter should have been made before deleting this file or the information needed to create the reports for the previous quarter will have been deleted. If this mistake was made, talk to the computer center about getting the file back.

The faculty evaluation system manager should send out instructor questionnaire request forms at the beginning of the quarter in order for them to be returned by about the middle of the quarter. The data entry person then enters the information into the computer by running the following program.

@TAKE INSTRC

```
This program modifies the list of instructors
using the faculty evaluation system.  This program
contains the following options:
        1) A - add an instructor
        2) D - delete an instructor
        3) P - creates a printable instructor file
        4) ? - prints this menu
```

Adding an instructor to the data base

The program prints out a number of options for the user. The user chooses an option and then enters the information that the prompts request. To add an instructor to the data base follow the example given below.

```
Enter option :  (A,D,P,?) A

Enter the instructor information.

Enter the instructor's name:  JONES
Enter instructor's initial:  J
Enter the dept.  abr.:  133
Enter the dept.  no.:  133
Enter the course number:  322
Enter the section number:  1
Enter number of forms:  22

Is information correct?  (Y or N) N
Enter the instructor's name:  JONES
Enter instructor's initial:  J
Enter the dept.  abr.:  CS
Enter the dept.  no.:  112
Enter the course number:  322
Enter the section number:  1
Enter number of forms:  22

Is information correct?  (Y or N) Y
```

In the above example the user made an error in entering the department abbreviation the first time and had to reenter the record to have the correct information in the record. If the user had not hit a carriage return before the error was noted the user could have corrected the mistake by using the delete key.

After the user has verified that the information is correct the program will continue and let the user enter in either the standard form number or the numbers of the instructor's picked questions. If the user is going to enter the instructor's picked questions then type the following:

```
Enter form number, (0 if picked questions): 0

Enter the question numbers for the instructor
If you have fewer than 23 questions type a ,0,
as the final question number to stop.

Enter the number of question 1 :1
Enter the number of question 2 :3
Enter the number of question 3 :5
Enter the number of question 4 :8
Enter the number of question 5 :33
Enter the number of question 6 :45
Enter the number of question 7 :67
Enter the number of question 8 :88
Enter the number of question 9 :29
Enter the number of question 10 :167
Enter the number of question 11 :322
Enter the number of question 12 :333
Enter the number of question 13 :451
Enter the number of question 14 :536
Enter the number of question 15 :857
Enter the number of question 16 :0
Is information correct? (Y or N) Y
```

The user may enter at most 23 instructor picked questions. If fewer questions are to be entered type a zero as the last question number. (See example above.) If the instructor has chosen a standard form then the following information should be entered.

Enter form number, (0 if picked questions): 2
Is information correct? (Y or N) Y

By entering the standard form number all of the questions in the standard form are entered into the instructor's record. The standard forms are entered into a data base by the question program which will be explained later in this manual.

Once an instructor record has been entered the following prompt is given.

Do you want to continue? (Y or N)

If the answer given to the question is ,N, then the program will stop and the user may continue to the next step of creating the questionnaire forms. If the answer to the question is ,Y, then the program will return with the prompt asking the user to enter in an option.

Deleting an instructor record

If an error in an instructor record is not noticed until after the record has been entered, then the user will want to delete the record. To delete a record the user types the following.

```
Enter option :  (A,D,P,?) D

Enter instructor's name being deleted:  JONES
Enter instructor's course number:  322

Instructor name: JONES
Instructor initial: J
Department abr: CS
Department no: 0112
Course number: 322
Section number: 001
No. of questions: 022
   1) 0001          13) 0451
   2) 0003          14) 0536
   3) 0005          15) 0857
   4) 0008          16) 0000
   5) 0033          17) 0000
   6) 0045          18) 0000
   7) 0067          19) 0000
   8) 0088          20) 0000
   9) 0029          21) 0000
  10) 0167          22) 0000
  11) 0322          23) 0000
  12) 0333

Do you wish to delete this instructor?  (Y or N) N
```

In the above example the user wanted to either delete or view the record. The user entered the instructor's name and the course that he was teaching. The instructor record was then displayed. If the user had chosen to delete the

record he could have typed ,Y, instead of ,N.

The routine will list all of the records that are in the instructor data base that have the same instructor and course names. If an instructor is teaching two sections of the same course both records will be displayed. By displaying all records that have these same fields the user can view records and remove duplicates.

If the user wants to see if a record was entered correctly he can run this routine and not delete the record.

Printing the instructor record

The user has the option of printing all of the instructor records in the data base. To print the records the user types the following:

Enter option : (A,D,P,?) P
Created file instr.rpt

The above file may be printed out on the line printer by typing the following after exitting the program:

@PRINT INSTR.RPT

The user should create the report periodically while entering the instructor records to see if all of the information is correct. A report will also be needed when the user is running the report program to see if any errors

were made in entering any information in that part of the system.

After the user has picked up a copy of the instructor records the file INSTR.RPT should be deleted to save some room. The report can be created again by running the BLDIST program so once a copy is obtained delete the file by typing the following:

@DEL INSTR.RPT

Printing questionnaires

Before the user runs the report to create the instructor questionnaires he should delete the batch file that keeps track of the number of the questionnaire form. To delete the batch file type the following:

@DEL BAT.NUM

The batch file should only be deleted once a quarter. The user should delete it before running the create instructor questionnaires routine for the first time in the current quarter.

To create the instructor questionnaires run the following program:

@RUN PRPT1

2 questionnaire forms created

EXIT

To print the questionnaire forms run the following program:

@TAKE PRCMD

The program PRPT1 creates questionnaire forms from the instructor records. The program will only create at most 100 forms at a time so as not to overload the line printer queue. The user will then have to wait until the forms have been printed before printing more. Usually it will take about a day to print 100 forms. If the user has entered more than 100 classes the routine will create at most 100 questionnaire forms and the commands to print them. The user will have to wait and rerun the program for the rest of the forms to be printed.

After the user has run the routine PRCMD the file PRCMD.CMD may be deleted since it is created each time the PRPT1 program is run. The routine PRCMD submits all of the questionnaire forms to be printed. To delete the file type the following:

@DEL PRCMD.CMD

The user may want to run the program PRPT1 after entering a couple of departments so that separation of forms will be made easier. The forms should be put into envelopes and sent to the respective department the week before the final week of regular classes.

To save space the instructor questionnaire forms are deleted after they have been printed. If an instructor's questionnaires are lost, then the instructor's record should be deleted from the data base by using the BLDIST program. The instructor record must then be reentered and printed again.

Manual for printing reports

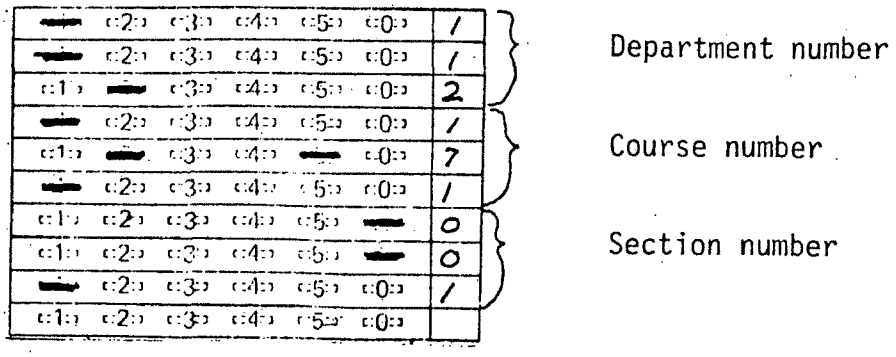
This section of the manual deals with producing the reports for the instructors and the faculty evaluation committee. The instructors or department turn in the questionnaire answer forms to some central location. The answer forms should for each instructor should be in an envelope with the instructor's name, department number, course and section number written on it.

Running Scantron Cards

A scantron identification card has to be made for each course. The scantron identification card will have the department number, course number, and section number marked on it as in figure (1). On the scantron card the first three fields are the deparment number, the second three fields are the course number, and the next three fields are the course section number. All three of the fields have to be filled out for the header record to be entered properly. If the number being entered is greater than 5 then the field marked 5 and another field have to be marked so the combined

sum of the two numbers equals the number desired. For example, by marking fields 5 and field 3 the number 8 will be entered. The identification card should then be placed into the envelope with the questionnaire answers.

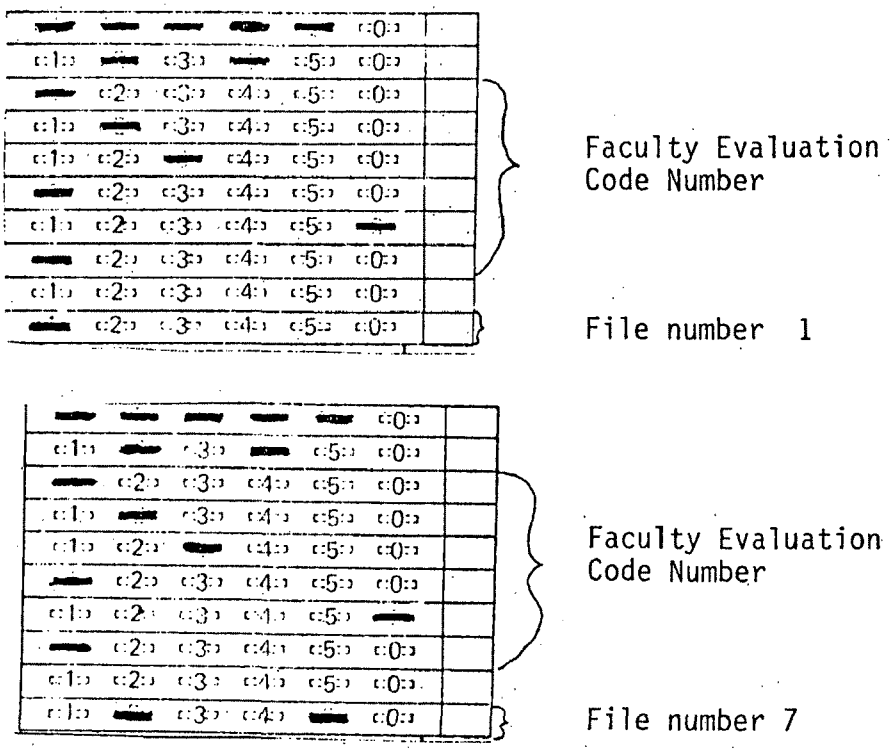
Figure 1



The person entering the questionnaire answer cards should be familiar with the use of the scantron card reader. Documentation on the use of the card reader is available at the computer center.

The faculty evaluation system was set up to run with the scantron card reader on the system. The scantron card reader allows the generation of up to 10 different files at a time. The data entry person has to fill out 10 cards to identify each of the files. An example on how to fill out the cards is shown below (fig.(2)).

Figure 2



In the example the first two fields tell the scantron card reader to expect an identification field. Fields two through eight represent the code number for the faculty evaluation area. This field tells the scantron card reader where to put the results from the cards that it is reading. The identification number is given to the user by the computer system operators. The last field in the header card is to set the file name number. The first header card in the example will create file ,FILE1.DTA, the second header card will create the file ,FILE7.DTA. In order to run the questionnaire answers the user should create cards

for file numbers zero through nine. The file identification cards may be used multiple times as needed.

Generating Statistics files

The user must delete the batch file for the statistics routine before running the statistics program for the first time in the quarter. To delete the batch file for the statistics routine, type the following:

@DEL BATCH.NUM

The batch file is used to number the statistics files produced by the STATS routine. The user must also delete all of the statistics files that were generated for the previous quarter. These files must be deleted or there will not be enough room to create all of the files for the current quarter. To delete the statistics files the user must type the following:

@DEL STS:*.*

The above files should only be deleted once a quarter.

To enter the questionnaire answers into the computer the user should log onto the computer and type the following:

@CONN

This will put the user into the area where the questionnaire answer files will be placed. The user then feeds in a file identification card, the course identification card, and the questionnaire answers for that course. This will create a file with the necessary information to produce a report. The user starts by using file identification card 0 and continues until he either has entered file 9, or no longer has any questionnaire answer cards to feed in.

The user must run the scantron card reader ,as specified in the scatron manual, so that each of the different sets of instructor questionnaire answers is placed in a different file. To briefly describe what must be done the user hits the rekey button twice, enters a set of cards (the file header card, course header card, and questionnaire answers for that course) then hits the rekey button twice more to close the file.

The user must perform the following commands to create the statistics files after the scantron files zero through nine have been created. The information will be over written if more cards are entered before the statistical routines have been executed.

The user will then type the following command:

@COPY FILE*.* FAC:

This is followed by a carriage return. This will copy the questionnaire data files into an area where they will be processed. The user then types:

@CONN FAC:
@RUN STATS

The first command connects the user to the directory where the information will be processed. The second commands takes the raw data and creates a statistics file on the questionnaire answers. The output from the program is as follows:

```
Input file is FILE0.SCN output file is IN0034.dta
Input file is FILE1.SCN output file is IN0035.DTA
Input file is FILE2.SCN output file is IN0036.DTA
Input file is FILE3.SCN output file is IN0037.DTA
Input file is FILE4.SCN output file is IN0038.DTA
?  FILE5.SCN (0) file not found
?  FILE6.SCN (0) file not found
?  FILE7.SCN (0) file not found
?  FILE8.SCN (0) file not found
?  FILE9.SCN (0) file not found
EXIT
```

In the above example statistics files were only generated for files 0-4; the other files were empty, so no information was generated about them.

It is extremely important that the user keep a log of what he is doing. The log should contain the following information for each set of course questionnaire answers: The instructor's name, the scantron file number used, and the statistics file number created. This information is used in the case where more than one teacher is teaching a class.

The following error message may occur:

File FILEN.SCN contains no data, rerun

Where the 'N' in the file name is the number of the file. This error message means that the scantron card reader is probably not reading in information correctly and is missing data. In this case the questionnaire answer cards for this course should be reentered.

The user the types the following commands:

@DEL FILE*.*
@EXP

This will delete the scantron files out of the work area.

The user then connects back the area where the scantron files are initially sent by typing :

@CONN

The user then deletes the scantron files from this area by typing:

@DEL FILE*.*
@EXP

Producing Evaluation Reports

After the user has entered as many questionnaire answers as desired, the report generation program may be run. The user needs to know the file numbers for which reports have to be generated. This information should be in the log that the data entry personal made while entering in the questionnaire forms. If the user knows that number of the file that a report was last generated for, then the file number of the last file entered can be found by typing:

@DIR STS:

The user then runs the following program to produce the report:

@RUN REPORT

The program will then list the following information:

```
ICES Report generating program.  This program will
generate reports for both the instructor and the
Faculty Evaluation Committee.  The instructor's
statistics file is used to get information from the
data base for the reports.

Do you want single or multiple file entry?  (S or M) M

Enter the lowest statistics file number:  1

Enter the highest statistics file number:  10

EXIT
```

In the above example the user typed ,M, to signify the entry of more than one file. The user then typed the number of the file where the reports were to start and then the number of the file where the reports were supposed to stop. The above routine will generate reports for files IN0001.DTA to IN0010.DTA.

If the user wants to generate a single report, he types the following:

```
@RUN REPORT
```

The program then prints the following:

```
ICES Report generating program.  This program will
generate reports for both the instructor and the
Faculty Evaluation Committee.  The instructor's
statistics file is used to get information from the
data base for the reports.

Do you want single or multiple file entry?  (S or M) S

Single file entry routine:
Enter statistics file number:  63
```

Enter the Instructor's last name: JONES

If you have another entry type ,c, to continue. C

Single file entry routine:
Enter statistics file number: 70

Enter the Instructor's last name: SMITH

If you have another entry type ,c, to continue. N

EXIT

In the above example a report will be produced for the files IN0063.DTA and IN0070.DTA. Note that when the user executes the report program in the single mode the last name of the instructor has to be entered. The reason for this is so that the program can find the correct instructor record in the instructor data base.

Correcting Report Errors

The report program will also produce an error report. If a statistics file has an error in it a report will not be generated for that instructor. The user has to correct the errors and rerun the report program.

The following errors can occur when running the report program.

Duplicate entry in file number: 34
run the file in single mode.

In the above example, more than one instructor was teaching the same course so the program needs additional information to produce the report. When the user runs the report program in single mode he has to type in the instructor's name. This provides the information necessary to produce a report for the instructor. Therefore whenever this error occurs run the report program for the file on single mode. The name of the instructor that corresponds to the file number should be in the log that the data entry personel is keeping when running the questionnaire answer forms.

File IN0034.dta not found

If this error is encountered there was something wrong with the entry of the information and the data belonging to that file has to be rerun.

If the report program is being run in single mode the following error message may occur:
Instructor's information not in data base

In this case the information about the file number or the instructor's name may have been entered incorrectly. If the information has been entered correctly then the user should check the list of all insturctor's in the data base to see if that entry was correct.

The remaining errors fall into roughly the same catagory. These errors have to do with either improperly entered header cards for the questionnaire answers, or the original instructor information was entered incorrectly. The error messages are as follows:

```
Department name for input file:  112
not found.

Course number for input file:  223
not found.

Section number for input file:  177
not found.
```

In the above error messages either the department, course, or section number was not found in the data base. In this case most of the errors are caused by incorrect header cards for the instructor's questionnaire answers. To correct this problem the following program must be executed to change the fields that are in error in the header record. Type the following:

```
@RUN EDSTAT

This routine allows the user to edit the header
record of the statistics file.

Enter the statistics file number:  1

Department number = 155
Course number = 368
Section number = 001

Do you wish to change the information?  (Y/N) Y

Enter the dept.  no.  :  155
Enter the course number :  368
Enter the section number:  10
```

```
Department number = 155
Course number = 368
Section number = 010

Do you wish to change the information?  (Y/N) N

If you have another entry type ,c, to continue.  N

EXIT
```

In the above exaple there was an error message written saying that the section number was not found for the file. By looking up what the number should have been in the instructor listing the user edited the header record in the statistics file to what it should be. A report will be created for the file by running the report routine in single mode.

Distribution of reports

Once the report program has been run the reports have to be printed. To print the reports type the following:

@TAKE WRITE.CMD

The above routine will print out the reports on the line printer. All of the reports are deleted after they have been printed to save space. To regenerate any of the reports the user runs the report program again with the file numbers desired. The above routine is executed for both the single and multiple entry modes for the report program.

After the reports have been printed they must be distributed to the different departments. The instructor's personal report must go only to the instructor since this is confidential information. The second report must go to the faculty evaluation committee for the instructor's department.

Manual for Question Maintainance

The routine described in this section of the manual is used for adding, deleting, and editting questions in the data base. The routine is also used to add and delete standard forms in the data base. This routine should be run after the reports have been generated from the previous quarter and before the information for the instructor's is entered for the current quarter.

To run the question maintainance program type the following:

@RUN QUEST

The program will then print out a menu of options for the user. The menu will appear as follows:

```
This program modifies the list of questions for the
ICES system.  This program contains the following options:
     1) M   Multiple question modification
     2) S   Single question modification
     3) D   Deletion of a question
     4) A   Adding a question
     5) P   Create a printable question list
     6) N   Add standard form numbers
     7) X   Delete a standard form
     8) L   List standard forms
     9) ?   Prints this menu
```

The maximum size of a question is 86 characters.

Multiple question modification

The first option listed for the question maintainance routine is for multiple question modification. This option was created to allow the user to change a large number of questions in the question data base. The routine is executed as follows:

```
Enter option M,S,D,A,P,N,X,L,?) M

Multiple question modification routine
Enter starting question number: 1

Enter end question number: 3

Each question that is entered has to be in two
parts of 43 characters or less) each.

0001 THE COURSE OBJECTIVES WERE VERY CLEAR.

Do you want to modify this question?  Y or N) N

0002 THE INSTRUCTOR STATED CLEARLY WHAT WAS
       EXPECTED OF STUDENTS.
Do you want to modify this question?  Y or N) N

0003 THE COURSE WAS WELL ORGANIZED.

Do you want to modify this question?  Y or N) Y

Enter the first half of the question.      !(43 char)
RATE THE COURSE ORGANIZATION.

Enter the second half of the question.     !(43 char)
```

In the above example the user entered the option for multiple question modifications. The user then entered the range of questions being modified. The user then answers

the prompt as to whether or not to modify a question. If the question is to be modified the user types in the question in two parts. Note on the prompt above the line where you are entering text there is a vertical bar (!(43 char)) which tells the user where to stop entering text. The program will only read the first 43 characters in for the question. Any additional characters will be ignored. The vertical bar is displayed to let the user know where the 43 character is. After the user has entered the first string the user is prompted for the second string. If the question has no second string then the user types a couple of carriage returns.

The following prompt is then printed:

Do you want to continue? Y or N) Y

The above prompt allows the user to exit the program or to return to the routine to enter in a new option.

Single question modification

If the user wants to modify only one question in the data base the following information is entered.

Enter option M,S,D,A,P,N,X,L,?) S

Enter question number: 5
The question that is to be entered has to be
in two parts of 43 characters or less) each.

```
0005 THE PROGRESSION OF THE COURSE WAS LOGICAL
     AND COHERENT FROM BEGINNING TO END.
Do you want to modify this question?  Y or N) Y

Enter the first half of the question.      !(43 char)
WAS THE PROGRESSION OF THE COURSE LOGICAL

Enter the second half of the question.     !(43 char)
AN COHERENT FROM THE START?
```

In the above example the user modified a single question. The question that initially was question number 5 was overwritten with the new version of the question. After entering the question the user has the option of returning to the main routine or exitting the program.

Deleting a question

To delete a question form the data base run the following routine.

```
Enter option :  (M,S,D,A,P,N,X,L,?) D

Enter the number of the question to be deleted:  5

0005 WAS THE PROGRESSION OF THE COURSE LOGICAL
     AN COHERENT FROM THE START?

Do you wish to delete this question?  (Y or N) Y
```

The above routine deletes a question from the data base. The user enters the question number to be deleted and verifies that it is the question to be deleted. The routine will then return with a prompt for the user to tell whether

he wants to return to the main routine or to exit the program.

Adding a question to the data base

To add a question to the data base the user runs the following option.

```
Enter option :  (M,S,D,A,P,N,X,L,?) A

The question that is to be added has to be in
two parts of 43 characters (or less) each.

Enter the first half of the question.      !(43 char)
THIS IS A TEST QUESTION.

Enter the second half of the question.     !(43 char)

Question 0898 created
```

In the above example the user entered a new question into the data base. The routine will always append the new question to the end of the question data base list. The user may enter the question in either upper or lower case characters.

Printing the question list

The user will want to print out copies of the questions to distribute to the departments using the system. To print a copy of the questions in the dat base the user runs the following routine.

Enter option : (M,S,D,A,P,N,X,L,?) P

Output file is quest.rpt

The routine has created a printable version of the questions. Assuming the user wants 10 copies he can exit the question routine and type the following to print them out on the line printer.

@PRINT QUEST.RPT/COPIES:10

It will probably take a day or so to print out 10 copies of the questions. Each question list is about 60 pages long therefore, the user should delete the file after it has been printed. To delete the questionnaire list file type the following:

@QUEST.RPT

Entering standard forms

Standard forms are lists of questions from the data base. If a department decides to use the same questionnaire form the user can enter in the question numbers for the

standard form. This saves a lot of time in typing question numbers into the instructor record, since you can simply enter the form number instead. This routine is useful to run along with the instructor entry routine. If a number of teachers are using the same questions, the questions may be entered as a standard form and then entered into the instructor's record as a standard form.

To create a new standard form the user types the following:

```
Enter option :  (M,S,D,A,P,N,X,L,?) N

Enter the question numbers for standard form
number 19.  If you have fewer than
23 questions type a ,0, as the final question
number to stop.

Enter the number of question 1 :234
Enter the number of question 2 :235
Enter the number of question 3 :236
Enter the number of question 4 :345
Enter the number of question 5 :366
Enter the number of question 6 :367
Enter the number of question 7 :380
Enter the number of question 8 :401
Enter the number of question 9 :599
Enter the number of question 10 :0
```

In the above example the user entered a standard form consisting of nine questions. When the user is running the instructor entry routine he would only have to type form number 19 instead of having to enter the numbers of the questions for the instructor if the instructor had choosen these questions.

The user may enter at most 23 question numbers for a given standard form. This limit is set by the number of questions that can be printed on the scantron form. The user may enter fewer than 23 questions if desired.

Deleting standard forms

The user has the option of deleting standard forms since some departments might decide to change their standard form. To reduce cluttering, the user may run the following routine.

```
Enter option :  (M,S,D,A,P,N,X,L,?) X
Enter the number of the form to be deleted:  19

   1) 0234          13) 0000
   2) 0235          14) 0000
   3) 0236          15) 0000
   4) 0345          16) 0000
   5) 0366          17) 0000
   6) 0367          18) 0000
   7) 0380          19) 0000
   8) 0401          20) 0000
   9) 0599          21) 0000
  10) 0000          22) 0000
  11) 0000          23) 0000
  12) 0000

Do you wish to delete this form?  (Y or N) Y
```

In the above example the question numbers in the standard form are displayed and the user has to verify that the form is to be deleted.

Printing standard forms

The last item on the question maintainence menu is to print out the standard forms. This routine will print out the questions that correspond to the question numbers

entered for the standard forms. This is the form that the standard forms will appear on the instructor's evaluation form. To create the file of all of the standard forms run the following routine.

```
Enter option :  (M,S,D,A,P,N,X,L,?) L

Output file is stan.rpt
Question 0005 not found
```

In the above example a printable version of the standard forms was created. Note that one of the standard forms used question number five and since that question was deleted an error message was printed. The routine will put a blank question into the file for any questions that it can not find in the data base. To print out the standard question file exit the question program and type the following.

```
@PRINT STAN.RPT
```

The standard forms should be printed from time to time to make sure that the correct question numbers where entered for the standard forms. After the standard forms have been printed the user should delete the file by typing the following:

```
@STAN.RPT
```

This concludes the quesion maintainance routines. If the user has any troubles with the question files he should read the faculty evaluation system maintainance manual.

APPENDIX B

SYSTEM MANUAL

System Maintainance Manual

The faculty evaluation system is composed of a number of pascal and command routines. The programs and the files that they need are discussed in this manual.

The following pascal programs are used:

BLDIST - Enter instructor records

EDSTAT - Edit statistics files

PRPT1 - Print questionnaire forms

QUEST - Maintain question data base

REPORT - Generate evaluation reports

STATS - Convert scantron files to stats. files

The following command and control files are used:

LOGIN - Sets logical names

INSTRC - Runs BLDIST and submits sort

SRT - Sort control file

WRITE - Submits report print request

The only file that is needed to run the system initially is the question file QUEST.DTA. There are a large number of other files that are created and modified by the system. These files have to maintained each quarter for proper operation of the system.

System Installation

The system was set up to operate using a main directory and at least two subdirectories. The programs are installed in the main directory and the reports generated are written to the subdirectories.

Each of the subdirectories should be capable of storing two million permanent characters and double that number in working storage. The main directory should also be of comparable size. The directories should be named as described in the LOGIN command file. The logical names that are defined in the LOGIN file are used by the programs to write temporary files to the appropriate directory.

The SRT control file is submitted to sort the instructor records. This file will need to be updated if the user is running the system on a computer system other than the DEC20/60. The sort that the control file uses is the defined system sort. If one is not available, the user may have to write his own sort.

The WRITE command submits the evaluation reports to the printer. This routine may have to be modified if there are any changes to forms or if the user wants to use different switches.

After the user has created the directories, all of the Pascal programs have to be compiled and loaded. The sources may then be moved to some other storage area. The question file QUEST.DTA must be installed in the main area of the system.

All of the other files that the system uses will be either initialized or updated by the programs. Some of these files have to be updated each quarter.

File Maintainance

The files used by this system are in a variety of catagories. Some of the files are used constantly, some are updated each quarter, and some are deleted after they are

printed.

The file QUEST.DTA is the data base for all of the questions. This file is never deleted, but may be modified each quarter between the time of running the reports from the previous quarter and entering the information for the instructors for the current quarter.

The file STAN.FRM is created when the user runs the QUEST program and enters a standard form. Once created this file need not be deleted. This file was set up to aid the user in entering information into the instructor record. By using the standard forms the user can enter a standard form number instead of typing in all of the questions that the instructor picked. This file may be modified as the user is using it.

The file INST.SRT is created by the BLDIST program. This file contains all of the instructor records. The file is created after the previous quarter's reports have been completed. This file must be kept until all of the reports have been created for the quarter for which the instructor information was entered. The file must be deleted before any instructor records are entered for the next quarter. In other words, this file should contain instructor information for one quarter only.

The report files that may be generated for the above file all end with the extension RPT. These files should be deleted as soon as the reports have been printed.

The questionnaire forms and the report forms are deleted automatically so the user does not have to worry about deleting them. The user should delete the command file PRCMD.CMD after it has been executed. This file is used to submit the print requests for the questionnaire forms so it is created again each time the routine PRPT1 is executed.

There are some files that must be deleted each quarter. These files are the batch number files and the old statistics files. The file BAT.NUM is used to keep track of the questionnaire file numbers. This file should be deleted at the beginning of each quarter before any questionnaires are generated. The file BATCH.NUM is used to keep track of the statistics files. This file should be deleted each quarter before the questionnaire answers are entered.

The statistics files are all located in one directory. Therefore the user may delete all of the files in this directory to get rid of the statistics files. The statistics files should be deleted after all of the reports have been generated for the instructors.

Other Errors

Most of the errors that the user may encounter are discussed in the User Manual. There are several system error messages that may occur at times.

When some of the programs are run for the first time an error message is printed that a particular file is not found. The user may ignore these messages since the programs will create these files.

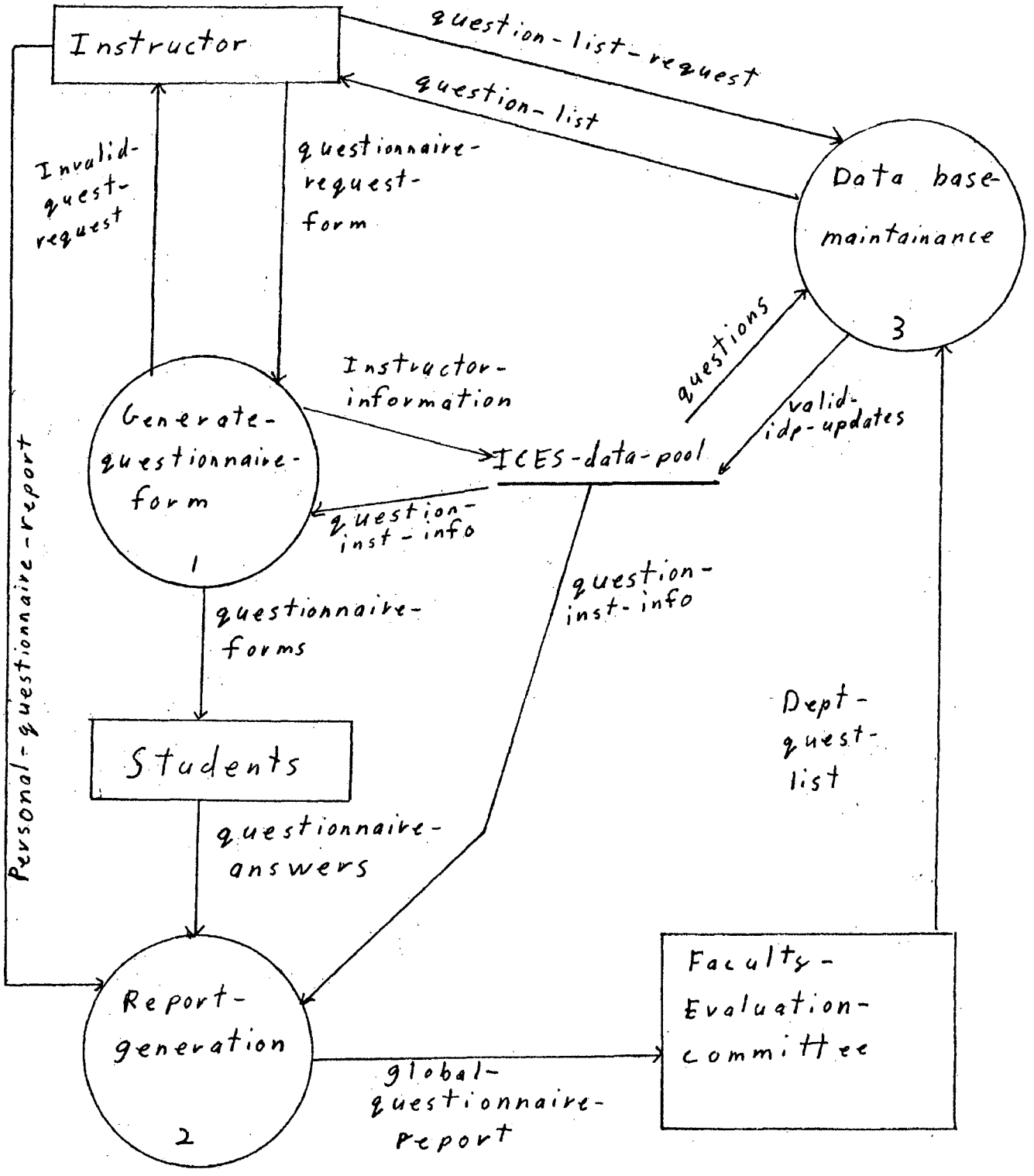
The user will get an error if he is in the wrong directory and trying to run a program. The main directory is defined in the LOGIN file as FAC: the user should connect to this directory and try running the routine again.

The user will get an error message if he exceeds permanent storage and the programs will fail if they try to write a file into an area that is exceeding its working storage. If the user is exceeding permanent storage he should delete the report files and other temporary file described above. If a user exceeds working storage then he should either try to get more directory space or delete temporary files. The only time this error will cause major problems is if the user is over working storage in the statistics directory. If this happens the user should try to obtain more storage space for the directory. If the user

cannot obtain any more space then all of the reports should be generated for the existing statistics files and then the user can delete all of the statistics files.

The programs were designed to catch most of the errors that the user can make. If an error occurs that is not discussed in the manuals, write down the exact wording of the error and call somebody who has knowledge about the computer system.

Diagram 0


Instructor
question-list-request
question-list
Invalid-quest-request
questionnaire-request-form
Data base-maintainance
3
questions
valid-idp-updates
Instructor-information
Generate-questionnaire-form
1
ICES-data-pool
question-inst-info
questionnaire-forms
question-inst-info
Personal-questionnaire-report
Dept-quest-list
Students
questionnaire-answers
Report-generation
2
Faculty-Evaluation-committee
global-questionnaire-report

LOGICAL-SYSTEM

Name Selection

Parameters: DB=LOGIC.DBF PRINT PUNCH=PSANAM.TMP EMPTY
SELECTION='TKEY="level-0"' ORDER=BYTYPE

1	course-number	ELEMENT
2	department-abbreviation	ELEMENT
3	department-number	ELEMENT
4	form-number	ELEMENT
5	frequency-of-answers	ELEMENT
6	instructor-picked-quest-num	ELEMENT
7	instructors-first-init	ELEMENT
8	instructors-last-name	ELEMENT
9	list-of-all-questions	ELEMENT
10	mean-of-answers	ELEMENT
11	num-quest-copies-request	ELEMENT
12	question-answers	ELEMENT
13	question-numbers	ELEMENT
14	section-number	ELEMENT
15	selected-questions	ELEMENT
16	standard-dev-of-answers	ELEMENT
17	standard-forms-list	ELEMENT
18	instructor-information	ENTITY
19	question-inst-info	ENTITY
20	questions	ENTITY
21	valid-idp-updates	ENTITY
22	dept-quest-list	INPUT
23	question-list-request	INPUT
24	questionnaire-answers	INPUT
25	questionnaire-request-form	INPUT
26	faculty-evaluation-committee	INTERFACE
27	instructor	INTERFACE
28	students	INTERFACE
29	global-questionnaire-report	OUTPUT
30	invalid-quest-request	OUTPUT
31	personal-questionnaire-report	OUTPUT
32	question-list	OUTPUT
33	questionnaire-forms	OUTPUT
34	database-maintainance	PROCESS
35	generate-questionnaire-form	PROCESS
36	report-generation	PROCESS
37	ices-data-pool	SET

LOGICAL-SYSTEM

Formatted Problem Statement

```
Parameters:   DB=LOGIC.DBF  FILE=PSANAM.TMP  INDEX
  NOPUNCHED-NAMES  PRINT  NOPUNCH  SMARG=5  NMARG=20  AMARG=10
  BMARG=25  RNMARG=60  CMARG=1  HMARG=23  ONE-PER-LINE
  COMMENT  NONEW-PAGE  NONEW-LINE  NOALL-STATEMENTS
  COMPLEMENTARY-STATEMENTS  LINE-NUMBERS  PRINTEOF
  DLC-COMMENT  NOSORT-NAME-LIST

  1 DEFINE ELEMENT        course-number;
  2      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
  3     DESCRIPTION;
  4    A University course number.;
  5     TRACE-KEY IS:  'level-0',
  6                    'level-1',
  7                    'level-1.1',
  8                    'level-2';
  9     CONTAINED IN:  instructor-information,
 10                    inst-general-info,
 11                    question-inst-info,
 12                    questionnaire-request-form,
 13                    global-questionnaire-report,
 14                    personal-questionnaire-report,
 15                    questionnaire-forms,
 16                    questionnaire-answers;
 17     VALUES ARE:
 18          1 THRU         999;
 19
 20 DEFINE ELEMENT        department-abbreviation;
 21      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 22     DESCRIPTION;
 23    The department abbreviation is a character string
 24 of letters.  The length of the string is between 0 and
 25 5 characters.;
 26     TRACE-KEY IS:  'level-0',
 27                    'level-1',
 28                    'level-1.1',
 29                    'level-2';
 30     CONTAINED IN:  instructor-information,
 31                    inst-general-info,
 32                    question-inst-info,
 33                    questionnaire-request-form,
 34                    global-questionnaire-report,
 35                    personal-questionnaire-report,
 36                    questionnaire-forms;
 37
 38 DEFINE ELEMENT        department-number;
 39      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 40     DESCRIPTION;
 41    The department number is a number used to identify
 42 a particular university department.;
```

Formatted Problem Statement

```
    TRACE-KEY IS:  'level-0',
                   'level-1',
                   'level-1.1',
                   'level-2';
    CONTAINED IN:  instructor-information,
                   inst-general-info,
                   question-inst-info,
                   questionnaire-request-form,
                   global-questionnaire-report,
                   personal-questionnaire-report,
                   questionnaire-forms,
                   questionnaire-answers;
    VALUES ARE:
         1 THRU         9999;

DEFINE ELEMENT        form-number;
     /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
    DESCRIPTION;
   The form number is used to obtain the question numbers
for questions in a given standard form.  The standard for...
be a list of up to 23 question numbers.;
    TRACE-KEY IS:  'level-0',
                   'level-1',
                   'level-1.1';
    CONTAINED IN:  inst-general-info,
                   questionnaire-request-form,
                   valid-idp-updates,
                   standard-form-quest-numbers;
    VALUES ARE:
         1 THRU         999;

DEFINE ELEMENT        frequency-of-answers;
     /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
    DESCRIPTION;
   The frequency of the answers is a list of the number
of occurances for each answer to a given question.;
    TRACE-KEY IS:  'level-0',
                   'level-2';
    CONTAINED IN:  questionnaire-answer-stats,
                   global-questionnaire-report,
                   personal-questionnaire-report;

DEFINE ELEMENT        instructor-picked-quest-num;
     /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
    DESCRIPTION;
   The instructor picked question numbers are a list of
numbers to questions in the question data base.  The inst...
chooses up to 23 questions from the data base and enters ...
numbers on his request form.;
```

Formatted Problem Statement

```
 92     TRACE-KEY IS:  'level-0',
 93                    'level-1',
 94                    'level-1.1',
 95                    'level-2';
 96     CONTAINED IN:  instructor-information,
 97                    question-inst-info,
 98                    questionnaire-request-form;
 99
100 DEFINE ELEMENT        instructors-first-init;
101      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
102     TRACE-KEY IS:  'level-0',
103                    'level-1',
104                    'level-1.1',
105                    'level-2';
106     CONTAINED IN:  instructor-information,
107                    inst-general-info,
108                    question-inst-info,
109                    questionnaire-request-form,
110                    global-questionnaire-report,
111                    personal-questionnaire-report,
112                    questionnaire-forms;
113
114 DEFINE ELEMENT        instructors-last-name;
115      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
116     DESCRIPTION;
117    The instructor's name is the first 14 characters in
118 his last name.;
119     TRACE-KEY IS:  'level-0',
120                    'level-1',
121                    'level-1.1',
122                    'level-2';
123     CONTAINED IN:  instructor-information,
124                    inst-general-info,
125                    question-inst-info,
126                    questionnaire-request-form,
127                    global-questionnaire-report,
128                    personal-questionnaire-report,
129                    questionnaire-forms;
130
131 DEFINE ELEMENT        list-of-all-questions;
132      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
133     DESCRIPTION;
134    This is a list of all of the questions that are
135 kept in the data base.  The questions are in three parts,
136 a question number, and two string parts each containing
137 half of a question.;
138     TRACE-KEY IS:  'level-0',
139                    'level-3';
140     CONTAINED IN:  questions,
```

Formatted Problem Statement

```
141                    question-list;
142
143 DEFINE ELEMENT          mean-of-answers;
144       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
145      DESCRIPTION;
146     The mean of answers will consist of two parts.
147 The first part is the mean of the answers to a particular
148 question.  The second part is a written description telling
149 weather the mean is high, high average, average, low
150 average, or low.  The second part was added to help
151 instructors interprete the results.;
152      TRACE-KEY IS:  'level-0',
153                     'level-2';
154      CONTAINED IN:  questionnaire-answer-stats,
155                     global-questionnaire-report,
156                     personal-questionnaire-report;
157
158 DEFINE ELEMENT          num-quest-copies-request;
159       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
160      DESCRIPTION;
161     The number of questionnaire copies are the number of
162 forms that are requested to be printed.;
163      TRACE-KEY IS:  'level-0',
164                     'level-1',
165                     'level-1.1';
166      CONTAINED IN:  instructor-information,
167                     inst-general-info,
168                     question-inst-info,
169                     questionnaire-request-form;
170
171 DEFINE ELEMENT          question-answers;
172       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
173      DESCRIPTION;
174     This is a list of symbols telling which answers
175 were picked for the questions in the questionnaire.;
176      TRACE-KEY IS:  'level-0',
177                     'level-2';
178      CONTAINED IN:  questionnaire-answers;
179
180 DEFINE ELEMENT          question-numbers;
181       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
182      DESCRIPTION;
183     The question numbers are the numbers for the questions
184 in the data base.;
185      TRACE-KEY IS:  'level-0',
186                     'level-1.1',
187                     'level-3';
188      CONTAINED IN:  dept-quest-list,
189                     valid-idp-updates,
```

Formatted Problem Statement

```
                    standard-form-quest-numbers;
     VALUES ARE:
          1 THRU         9999;

DEFINE ELEMENT         section-number;
      /*   DATE OF LAST CHANGE - Apr 21, 1983, 22:55:36 */
     DESCRIPTION;
    The section number is the section number for a given
university course.;
     TRACE-KEY IS:  'level-0',
                    'level-1',
                    'level-1.1',
                    'level-2';
     CONTAINED IN:  instructor-information,
                    inst-general-info,
                    question-inst-info,
                    questionnaire-request-form,
                    global-questionnaire-report,
                    personal-questionnaire-report,
                    questionnaire-forms,
                    questionnaire-answers;
     VALUES ARE:
          1 THRU         999;

DEFINE ELEMENT         selected-questions;
      /*   DATE OF LAST CHANGE - Apr 21, 1983, 22:55:36 */
     DESCRIPTION;
    The selected questions are a list of up to
23 question numbers.  These will be used to obtain the
corresponding questions from the data base.  The questions
are either instructor picked or standard form questions.;
     TRACE-KEY IS:  'level-0',
                    'level-1',
                    'level-2';
     CONTAINED IN:  question-inst-info,
                    questionnaire-forms,
                    personal-questionnaire-report;

DEFINE ELEMENT         standard-dev-of-answers;
      /*   DATE OF LAST CHANGE - Apr 21, 1983, 22:55:36 */
     DESCRIPTION;
    The standard deviation of the answers is in two
parts.  The first part lists the standard deviation of
a particular question.  The second part uses the standard
deviation to list weather the consensus on the answer was,
high, average, or low.;
     TRACE-KEY IS:  'level-0',
                    'level-2';
     CONTAINED IN:  questionnaire-answer-stats,
```

Formatted Problem Statement

```
                    global-questionnaire-report,
                    personal-questionnaire-report;

DEFINE ELEMENT          standard-forms-list;
     /*   DATE OF LAST CHANGE - Apr 21, 1983, 22:55:36 */
    DESCRIPTION;
   This form will be a list of all standard forms
currently in the data base.  It will list out the questions
in each of the standard forms.;
    TRACE-KEY IS:   'level-0',
                    'level-3';
    CONTAINED IN:   questions,
                    question-list;

DEFINE ENTITY           instructor-information;
     /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
    TRACE-KEY IS:   'level-0',
                    'level-1',
                    'level-1.1';
    CONSISTS OF:
         course-number,
         department-abbreviation,
         department-number,
         instructor-picked-quest-num,
         instructors-first-init,
         instructors-last-name,
         num-quest-copies-request,
         section-number;
    DERIVED BY:     generate-questionnaire-form
      USING:        question-inst-info,
                    questionnaire-request-form;
    DERIVED BY:     get-standard-form
      USING:        standard-form-quest-numbers,
                    inst-general-info;
    DERIVED BY:     create-instructor-database
      USING:        questionnaire-request-form;
    DERIVED BY:     get-inst-picked-quests
      USING:        inst-general-info,
                    questionnaire-request-form;
    USED BY:
        generate-questionnaire-form
         TO UPDATE      ices-data-pool;

DEFINE ENTITY           question-inst-info;
     /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
    TRACE-KEY IS:   'level-0',
                    'level-1',
                    'level-2';
    COLLECTED IN:   ices-data-pool;
```

Formatted Problem Statement

```
288     CONSISTS OF:
289          course-number,
290          department-abbreviation,
291          department-number,
292          instructor-picked-quest-num,
293          instructors-first-init,
294          instructors-last-name,
295          num-quest-copies-request,
296          section-number,
297          selected-questions;
298     USED BY:
299          generate-questionnaire-form
300           TO DERIVE     instructor-information;
301     USED BY:
302          generate-questionnaire-form
303           TO DERIVE     invalid-quest-request;
304     USED BY:
305          generate-questionnaire-form
306           TO DERIVE     questionnaire-forms;
307     USED BY:
308          report-generation
309           TO DERIVE     personal-questionnaire-report;
310     USED BY:
311          report-generation
312           TO DERIVE     global-questionnaire-report;
313     USED BY:
314          questionnaire-print-routine
315           TO DERIVE     questionnaire-forms;
316     USED BY:
317          print-reports
318           TO DERIVE     personal-questionnaire-report;
319     USED BY:
320          print-reports
321           TO DERIVE     global-questionnaire-report;
322
323 DEFINE ENTITY          questions;
324      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
325     TRACE-KEY IS:  'level-0',
326                    'level-3';
327     COLLECTED IN:  ices-data-pool;
328     CONSISTS OF:
329          list-of-all-questions,
330          standard-forms-list;
331     USED BY:
332          database-maintainance
333           TO DERIVE     question-list;
334     USED BY:
335          print-questions
336           TO DERIVE     question-list;
```

Formatted Problem Statement

```
337
338 DEFINE ENTITY          valid-idp-updates;
339      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
340     TRACE-KEY IS:  'level-0',
341                    'level-3';
342     CONSISTS OF:
343          form-number,
344          question-numbers;
345     DERIVED BY:    database-maintainance
346       USING:       dept-quest-list;
347     DERIVED BY:    update-questions
348       USING:       dept-quest-list;
349     USED BY:
350          database-maintainance
351           TO UPDATE     ices-data-pool;
352
353 DEFINE INPUT           dept-quest-list;
354      /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
355     TRACE-KEY IS:  'level-0',
356                    'level-3';
357     GENERATED:      BY faculty-evaluation-committee;
358     CONSISTS OF:
359          question-numbers;
360     USED BY:
361          database-maintainance
362           TO DERIVE     valid-idp-updates;
363     USED BY:
364          update-questions
365           TO DERIVE     valid-idp-updates;
366
367 DEFINE INPUT          question-list-request;
368      /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
369     TRACE-KEY IS:  'level-0',
370                    'level-3';
371     GENERATED:      BY instructor;
372     USED BY:
373          database-maintainance
374           TO DERIVE     question-list;
375     USED BY:
376          print-questions
377           TO DERIVE     question-list;
378
379 DEFINE INPUT           questionnaire-answers;
380      /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
381     TRACE-KEY IS:  'level-0',
382                    'level-2';
383     GENERATED:      BY students;
384     CONSISTS OF:
385          course-number,
```

Formatted Problem Statement

```
386          department-number,
387          question-answers,
388          section-number;
389     USED BY:
390          generate-statistics
391           TO DERIVE     questionnaire-answer-stats;
392     USED BY:
393          report-generation
394           TO DERIVE     personal-questionnaire-report;
395     USED BY:
396          report-generation
397           TO DERIVE     global-questionnaire-report;
398
399 DEFINE INPUT          questionnaire-request-form;
400      /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
401     TRACE-KEY IS:  'level-0',
402                    'level-1',
403                    'level-1.1';
404     GENERATED:      BY instructor;
405     CONSISTS OF:
406          course-number,
407          department-abbreviation,
408          department-number,
409          form-number,
410          instructor-picked-quest-num,
411          instructors-first-init,
412          instructors-last-name,
413          num-quest-copies-request,
414          section-number;
415     USED BY:
416          generate-questionnaire-form
417           TO DERIVE     questionnaire-forms;
418     USED BY:
419          create-instructor-database
420           TO DERIVE     invalid-quest-request;
421     USED BY:
422          create-instructor-database
423           TO DERIVE     instructor-information;
424     USED BY:
425          generate-questionnaire-form
426           TO DERIVE     instructor-information;
427     USED BY:
428          generate-questionnaire-form
429           TO DERIVE     invalid-quest-request;
430     USED BY:
431          get-inst-general-info
432           TO DERIVE     inst-general-info;
433     USED BY:
434          get-inst-general-info
```

Formatted Problem Statement

```
435           TO DERIVE     invalid-quest-request;
436     USED BY:
437          get-inst-picked-quests
438           TO DERIVE     instructor-information;
439
440 DEFINE INTERFACE      faculty-evaluation-committee;
441      /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
442     TRACE-KEY IS:  'level-0';
443     GENERATES:
444          dept-quest-list;
445     RECEIVES:
446          global-questionnaire-report;
447
448 DEFINE INTERFACE      instructor;
449      /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
450     TRACE-KEY IS:  'level-0';
451     GENERATES:
452          question-list-request,
453          questionnaire-request-form;
454     RECEIVES:
455          question-list,
456          invalid-quest-request,
457          personal-questionnaire-report;
458
459 DEFINE INTERFACE      students;
460      /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
461     TRACE-KEY IS:  'level-0';
462     GENERATES:
463          questionnaire-answers;
464     RECEIVES:
465          questionnaire-forms;
466
467 DEFINE OUTPUT         global-questionnaire-report;
468      /*   DATE OF LAST CHANGE - Apr 21, 1983, 22:59:46 */
469     DESCRIPTION;
470    The global questionnaire report will contain
471 the general information about the instructor.  The questions
472 that will be in the report will be the demographic questions
473 about the students and the general questions about the
474 instructor.  The report will also list the frequency of
475 the quesion answers, and the mean and standard deviation
476 for each question.;
477     TRACE-KEY IS:  'level-0',
478                    'level-2';
479     RECEIVED:       BY faculty-evaluation-committee;
480     CONSISTS OF:
481          course-number,
482          department-abbreviation,
483          department-number,
```

Formatted Problem Statement

```
484          frequency-of-answers,
485          instructors-first-init,
486          instructors-last-name,
487          mean-of-answers,
488          section-number,
489          standard-dev-of-answers;
490      DERIVED BY:    report-generation
491        USING:       question-inst-info,
492                     questionnaire-answers;
493      DERIVED BY:    print-reports
494        USING:       question-inst-info;
495      DERIVED BY:    print_reports
496        USING:       questionnaire-answer-stats;
497
498  DEFINE OUTPUT          invalid-quest-request;
499       /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
500      TRACE-KEY IS:  'level-0',
501                     'level-1',
502                     'level-1.1';
503      RECEIVED:       BY instructor;
504      DERIVED BY:    generate-questionnaire-form
505        USING:       question-inst-info,
506                     questionnaire-request-form;
507      DERIVED BY:    create-instructor-database
508        USING:       questionnaire-request-form;
509      DERIVED BY:    get-inst-general-info
510        USING:       questionnaire-request-form;
511
512  DEFINE OUTPUT          personal-questionnaire-report;
513       /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
514      DESCRIPTION;
515     The personal questionnaire report will contain the
516  instructor's general information.  The questions that will
517  be listed in the report are the demographic questions about
518  the students, the general questions about the instructor,
519  and the instructor's picked questions.  For each question
520  a frequency of the occurance of the answers will be given,
521  along with the mean and standard deviation of the question.
522  A written description of the mean and standard deviation ...
523  be given to help the instructor interpret the results.;
524      TRACE-KEY IS:  'level-0',
525                     'level-2';
526      RECEIVED:       BY instructor;
527      CONSISTS OF:
528           course-number,
529           department-abbreviation,
530           department-number,
531           frequency-of-answers,
532           instructors-first-init,
```

Formatted Problem Statement

```
533          instructors-last-name,
534          mean-of-answers,
535          section-number,
536          selected-questions,
537          standard-dev-of-answers;
538      DERIVED BY:    report-generation
539        USING:       question-inst-info,
540                     questionnaire-answers;
541      DERIVED BY:    print-reports
542        USING:       question-inst-info;
543
544  DEFINE OUTPUT          question-list;
545       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
546      TRACE-KEY IS:  'level-0',
547                     'level-3';
548      RECEIVED:       BY instructor;
549      CONSISTS OF:
550           list-of-all-questions,
551           standard-forms-list;
552      DERIVED BY:    database-maintainance
553        USING:       questions,
554                     question-list-request;
555      DERIVED BY:    print-questions
556        USING:       questions,
557                     question-list-request;
558
559  DEFINE OUTPUT          questionnaire-forms;
560       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
561      DESCRIPTION;
562     The questionnaire-forms will have the demographic
563  questions about the students and the instructor's general
564  questions preprinted on them.  The forms will also have
565  a scantron readable section along the right boarder.  The
566  general information about the instructor and his personal
567  questions will be printed on the form.;
568      TRACE-KEY IS:  'level-0',
569                     'level-1';
570      RECEIVED:       BY students;
571      CONSISTS OF:
572           course-number,
573           department-abbreviation,
574           department-number,
575           instructors-first-init,
576           instructors-last-name,
577           section-number,
578           selected-questions;
579      DERIVED BY:    generate-questionnaire-form
580        USING:       question-inst-info,
581                     questionnaire-request-form;
```

Formatted Problem Statement

```
582     DERIVED BY:    questionnaire-print-routine
583       USING:       question-inst-info;
584
585 DEFINE PROCESS         database-maintainance;
586      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
587     SYNONYMS ARE:  dfd3;
588     TRACE-KEY IS:  'level-0';
589     SUBPARTS ARE:  print-questions,
590                    update-questions;
591     DERIVES:       question-list
592       USING:       questions,
593                    question-list-request;
594     DERIVES:       valid-idp-updates
595       USING:       dept-quest-list;
596     UPDATES:       ices-data-pool
597       USING:       valid-idp-updates;
598
599 DEFINE PROCESS         generate-questionnaire-form;
600      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
601     SYNONYMS ARE:  dfd1;
602     TRACE-KEY IS:  'level-0';
603     SUBPARTS ARE:  create-instructor-database,
604                    questionnaire-print-routine;
605     DERIVES:       instructor-information
606       USING:       question-inst-info,
607                    questionnaire-request-form;
608     DERIVES:       invalid-quest-request
609       USING:       question-inst-info,
610                    questionnaire-request-form;
611     DERIVES:       questionnaire-forms
612       USING:       question-inst-info,
613                    questionnaire-request-form;
614     UPDATES:       ices-data-pool
615       USING:       instructor-information;
616
617 DEFINE PROCESS         report-generation;
618      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
619     SYNONYMS ARE:  dfd2;
620     TRACE-KEY IS:  'level-0';
621     SUBPARTS ARE:  generate-statistics,
622                    print-reports;
623     DERIVES:       personal-questionnaire-report
624       USING:       question-inst-info,
625                    questionnaire-answers;
626     DERIVES:       global-questionnaire-report
627       USING:       question-inst-info,
628                    questionnaire-answers;
629
630 DEFINE SET             ices-data-pool;
```

Formatted Problem Statement

```
631       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
632      TRACE-KEY IS:  'level-0';
633      COLLECTION OF:
634           question-inst-info,
635           questions,
636           standard-form-quest-numbers;
637      UPDATED BY:    database-maintainance
638        USING:       valid-idp-updates;
639      UPDATED BY:    generate-questionnaire-form
640        USING:       instructor-information;
641
642 EOF EOF EOF EOF EOF
```

Index

Index

Index

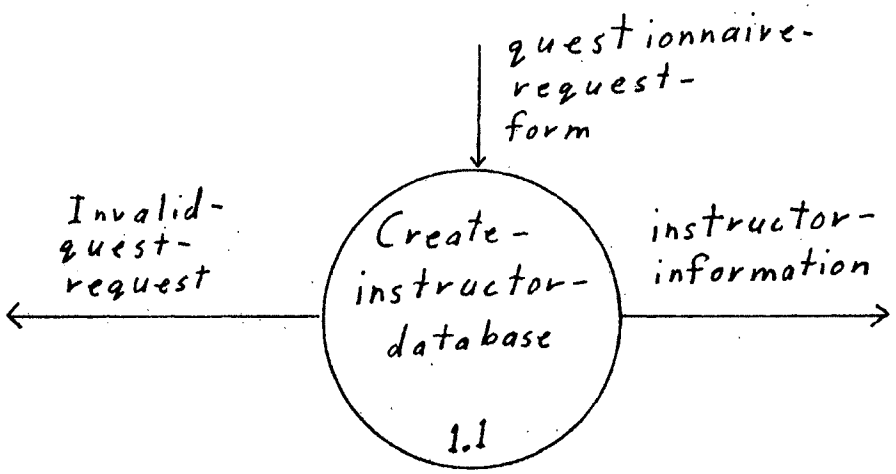
LOGICAL-SYSTEM

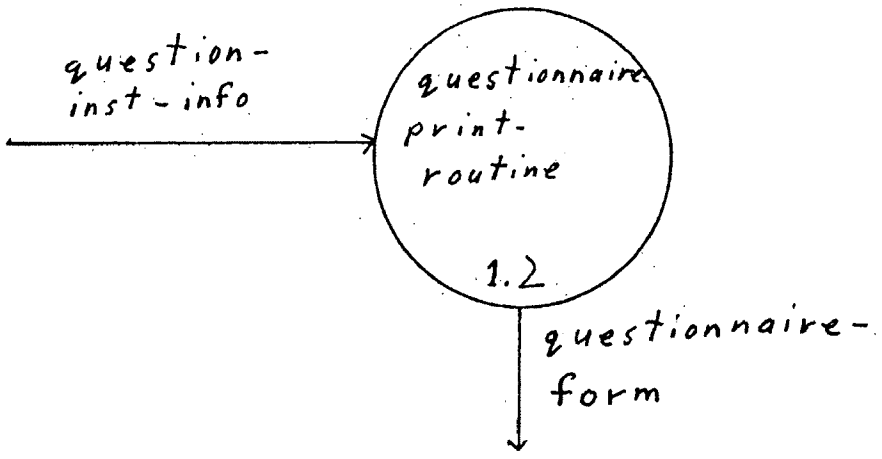
Name Selection

Parameters: DB=LOGIC.DBF PRINT PUNCH=PSANAM.TMP EMPTY
SELECTION='TKEY="level-1"' ORDER=BYTYPE

1	course-number	ELEMENT
2	department-abbreviation	ELEMENT
3	department-number	ELEMENT
4	form-number	ELEMENT
5	instructor-picked-quest-num	ELEMENT
6	instructors-first-init	ELEMENT
7	instructors-last-name	ELEMENT
8	num-quest-copies-request	ELEMENT
9	section-number	ELEMENT
10	selected-questions	ELEMENT
11	instructor-information	ENTITY
12	question-inst-info	ENTITY
13	questionnaire-request-form	INPUT
14	invalid-quest-request	OUTPUT
15	questionnaire-forms	OUTPUT
16	create-instructor-database	PROCESS
17	questionnaire-print-routine	PROCESS

Diagram 1


questionnaire-
request-
form
Invalid-
quest-
request
Create-
instructor-
database
1.1
instructor-
information


question-
inst-info
questionnaire
print-
routine
1.2
questionnaire-
form

Formatted Problem Statement

```
Parameters:   DB=LOGIC.DBF  FILE=PSANAM.TMP  INDEX
  NOPUNCHED-NAMES  PRINT  NOPUNCH  SMARG=5  NMARG=20  AMARG=10
  BMARG=25  RNMARG=60  CMARG=1  HMARG=23  ONE-PER-LINE
  COMMENT  NONEW-PAGE  NONEW-LINE  NOALL-STATEMENTS
  COMPLEMENTARY-STATEMENTS  LINE-NUMBERS  PRINTEOF
  DLC-COMMENT  NOSORT-NAME-LIST

  1 DEFINE ELEMENT        course-number;
  2      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
  3     DESCRIPTION;
  4    A University course number.;
  5     TRACE-KEY IS:  'level-0',
  6                    'level-1',
  7                    'level-1.1',
  8                    'level-2';
  9     CONTAINED IN:  instructor-information,
 10                    inst-general-info,
 11                    question-inst-info,
 12                    questionnaire-request-form,
 13                    global-questionnaire-report,
 14                    personal-questionnaire-report,
 15                    questionnaire-forms,
 16                    questionnaire-answers;
 17     VALUES ARE:
 18          1 THRU         999;
 19
 20 DEFINE ELEMENT        department-abbreviation;
 21      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 22     DESCRIPTION;
 23    The department abbreviation is a character string
 24 of letters.  The length of the string is between 0 and
 25 5 characters.;
 26     TRACE-KEY IS:  'level-0',
 27                    'level-1',
 28                    'level-1.1',
 29                    'level-2';
 30     CONTAINED IN:  instructor-information,
 31                    inst-general-info,
 32                    question-inst-info,
 33                    questionnaire-request-form,
 34                    global-questionnaire-report,
 35                    personal-questionnaire-report,
 36                    questionnaire-forms;
 37
 38 DEFINE ELEMENT        department-number;
 39      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 40     DESCRIPTION;
 41    The department number is a number used to identify
 42 a particular university department.;
```

Formatted Problem Statement

```
43      TRACE-KEY IS:  'level-0',
44                     'level-1',
45                     'level-1.1',
46                     'level-2';
47      CONTAINED IN:  instructor-information,
48                     inst-general-info,
49                     question-inst-info,
50                     questionnaire-request-form,
51                     global-questionnaire-report,
52                     personal-questionnaire-report,
53                     questionnaire-forms,
54                     questionnaire-answers;
55      VALUES ARE:
56          1 THRU          9999;
57
58  DEFINE ELEMENT         form-number;
59       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
60      DESCRIPTION;
61     The form number is used to obtain the question numbers
62  for questions in a given standard form.  The standard for...
63  be a list of up to 23 question numbers.;
64      TRACE-KEY IS:  'level-0',
65                     'level-1',
66                     'level-1.1';
67      CONTAINED IN:  inst-general-info,
68                     questionnaire-request-form,
69                     valid-idp-updates,
70                     standard-form-quest-numbers;
71      VALUES ARE:
72          1 THRU          999;
73
74  DEFINE ELEMENT         instructor-picked-quest-num;
75       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
76      DESCRIPTION;
77     The instructor picked question numbers are a list of
78  numbers to questions in the question data base.  The inst...
79  chooses up to 23 questions from the data base and enters ...
80  numbers on his request form.;
81      TRACE-KEY IS:  'level-0',
82                     'level-1',
83                     'level-1.1',
84                     'level-2';
85      CONTAINED IN:  instructor-information,
86                     question-inst-info,
87                     questionnaire-request-form;
88
89  DEFINE ELEMENT         instructors-first-init;
90       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
91      TRACE-KEY IS:  'level-0',
```

Formatted Problem Statement

```
 92                    'level-1',
 93                    'level-1.1',
 94                    'level-2';
 95      CONTAINED IN: instructor-information,
 96                    inst-general-info,
 97                    question-inst-info,
 98                    questionnaire-request-form,
 99                    global-questionnaire-report,
100                    personal-questionnaire-report,
101                    questionnaire-forms;
102
103 DEFINE ELEMENT         instructors-last-name;
104       /*  DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
105      DESCRIPTION;
106     The instructor's name is the first 14 characters in
107 his last name.;
108      TRACE-KEY IS:  'level-0',
109                    'level-1',
110                    'level-1.1',
111                    'level-2';
112      CONTAINED IN: instructor-information,
113                    inst-general-info,
114                    question-inst-info,
115                    questionnaire-request-form,
116                    global-questionnaire-report,
117                    personal-questionnaire-report,
118                    questionnaire-forms;
119
120 DEFINE ELEMENT         num-quest-copies-request;
121       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
122      DESCRIPTION;
123     The number of questionnaire copies are the number of
124 forms that are requested to be printed.;
125      TRACE-KEY IS:  'level-0',
126                    'level-1',
127                    'level-1.1';
128      CONTAINED IN: instructor-information,
129                    inst-general-info,
130                    question-inst-info,
131                    questionnaire-request-form;
132
133 DEFINE ELEMENT         section-number;
134       /*   DATE OF LAST CHANGE - Apr 21, 1983, 22:55:36 */
135      DESCRIPTION;
136     The section number is the section number for a given
137 university course.;
138      TRACE-KEY IS:  'level-0',
139                    'level-1',
140                    'level-1.1',
```

Formatted Problem Statement

```
141                    'level-2';
142     CONTAINED IN:  instructor-information,
143                    inst-general-info,
144                    question-inst-info,
145                    questionnaire-request-form,
146                    global-questionnaire-report,
147                    personal-questionnaire-report,
148                    questionnaire-forms,
149                    questionnaire-answers;
150     VALUES ARE:
151          1 THRU         999;
152
153 DEFINE ELEMENT         selected-questions;
154      /*   DATE OF LAST CHANGE - Apr 21, 1983, 22:55:36 */
155     DESCRIPTION;
156    The selected questions are a list of up to
157 23 question numbers.  These will be used to obtain the
158 corresponding questions from the data base.  The questions
159 are either instructor picked or standard form questions.;
160     TRACE-KEY IS:  'level-0',
161                    'level-1',
162                    'level-2';
163     CONTAINED IN:  question-inst-info,
164                    questionnaire-forms,
165                    personal-questionnaire-report;
166
167 DEFINE ENTITY          instructor-information;
168      /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
169     TRACE-KEY IS:  'level-0',
170                    'level-1',
171                    'level-1.1';
172     CONSISTS OF:
173          course-number,
174          department-abbreviation,
175          department-number,
176          instructor-picked-quest-num,
177          instructors-first-init,
178          instructors-last-name,
179          num-quest-copies-request,
180          section-number;
181     DERIVED BY:    generate-questionnaire-form
182       USING:       question-inst-info,
183                    questionnaire-request-form;
184     DERIVED BY:    get-standard-form
185       USING:       standard-form-quest-numbers,
186                    inst-general-info;
187     DERIVED BY:    create-instructor-database
188       USING:       questionnaire-request-form;
189     DERIVED BY:    get-inst-picked-quests
```

Formatted Problem Statement

```
190       USING:        inst-general-info,
191                     questionnaire-request-form;
192     USED BY:
193          generate-questionnaire-form
194           TO UPDATE     ices-data-pool;
195
196 DEFINE ENTITY          question-inst-info;
197      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
198     TRACE-KEY IS:  'level-0',
199                    'level-1',
200                    'level-2';
201     COLLECTED IN:  ices-data-pool;
202     CONSISTS OF:
203          course-number,
204          department-abbreviation,
205          department-number,
206          instructor-picked-quest-num,
207          instructors-first-init,
208          instructors-last-name,
209          num-quest-copies-request,
210          section-number,
211          selected-questions;
212     USED BY:
213          generate-questionnaire-form
214           TO DERIVE     instructor-information;
215     USED BY:
216          generate-questionnaire-form
217           TO DERIVE     invalid-quest-request;
218     USED BY:
219          generate-questionnaire-form
220           TO DERIVE     questionnaire-forms;
221     USED BY:
222          report-generation
223           TO DERIVE     personal-questionnaire-report;
224     USED BY:
225          report-generation
226           TO DERIVE     global-questionnaire-report;
227     USED BY:
228          questionnaire-print-routine
229           TO DERIVE     questionnaire-forms;
230     USED BY:
231          print-reports
232           TO DERIVE     personal-questionnaire-report;
233     USED BY:
234          print-reports
235           TO DERIVE     global-questionnaire-report;
236
237 DEFINE INPUT          questionnaire-request-form;
238      /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
```

Formatted Problem Statement

```
239     TRACE-KEY IS:  'level-0',
240                    'level-1',
241                    'level-1.1';
242     GENERATED:      BY instructor;
243     CONSISTS OF:
244          course-number,
245          department-abbreviation,
246          department-number,
247          form-number,
248          instructor-picked-quest-num,
249          instructors-first-init,
250          instructors-last-name,
251          num-quest-copies-request,
252          section-number;
253     USED BY:
254          generate-questionnaire-form
255           TO DERIVE     questionnaire-forms;
256     USED BY:
257          create-instructor-database
258           TO DERIVE     invalid-quest-request;
259     USED BY:
260          create-instructor-database
261           TO DERIVE     instructor-information;
262     USED BY:
263          generate-questionnaire-form
264           TO DERIVE     instructor-information;
265     USED BY:
266          generate-questionnaire-form
267           TO DERIVE     invalid-quest-request;
268     USED BY:
269          get-inst-general-info
270           TO DERIVE     inst-general-info;
271     USED BY:
272          get-inst-general-info
273           TO DERIVE     invalid-quest-request;
274     USED BY:
275          get-inst-picked-quests
276           TO DERIVE     instructor-information;
277
278 DEFINE OUTPUT         invalid-quest-request;
279      /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
280     TRACE-KEY IS:  'level-0',
281                    'level-1',
282                    'level-1.1';
283     RECEIVED:       BY instructor;
284     DERIVED BY:    generate-questionnaire-form
285       USING:       question-inst-info,
286                    questionnaire-request-form;
287     DERIVED BY:    create-instructor-database
```

Formatted Problem Statement

```
288       USING:        questionnaire-request-form;
289     DERIVED BY:     get-inst-general-info
290       USING:        questionnaire-request-form;
291
292 DEFINE OUTPUT          questionnaire-forms;
293      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
294     DESCRIPTION;
295    The questionnaire-forms will have the demographic
296 questions about the students and the instructor's general
297 questions preprinted on them.  The forms will also have
298 a scantron readable section along the right boarder.  The
299 general information about the instructor and his personal
300 questions will be printed on the form.;
301     TRACE-KEY IS:  'level-0',
302                    'level-1';
303     RECEIVED:       BY students;
304     CONSISTS OF:
305          course-number,
306          department-abbreviation,
307          department-number,
308          instructors-first-init,
309          instructors-last-name,
310          section-number,
311          selected-questions;
312     DERIVED BY:     generate-questionnaire-form
313       USING:        question-inst-info,
314                     questionnaire-request-form;
315     DERIVED BY:     questionnaire-print-routine
316       USING:        question-inst-info;
317
318 DEFINE PROCESS          create-instructor-database;
319      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
320     SYNONYMS ARE:  dfd1.1;
321     TRACE-KEY IS:  'level-1';
322     SUBPARTS ARE:  get-inst-general-info,
323                    get-standard-form,
324                    get-inst-picked-quests;
325     PART OF:       generate-questionnaire-form;
326     DERIVES:       invalid-quest-request
327       USING:       questionnaire-request-form;
328     DERIVES:       instructor-information
329       USING:       questionnaire-request-form;
330
331 DEFINE PROCESS          questionnaire-print-routine;
332      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
333     SYNONYMS ARE:  dfd1.2;
334     DESCRIPTION;
335    This process wil use the information given it
336 to produce the requested number of copies of the
```

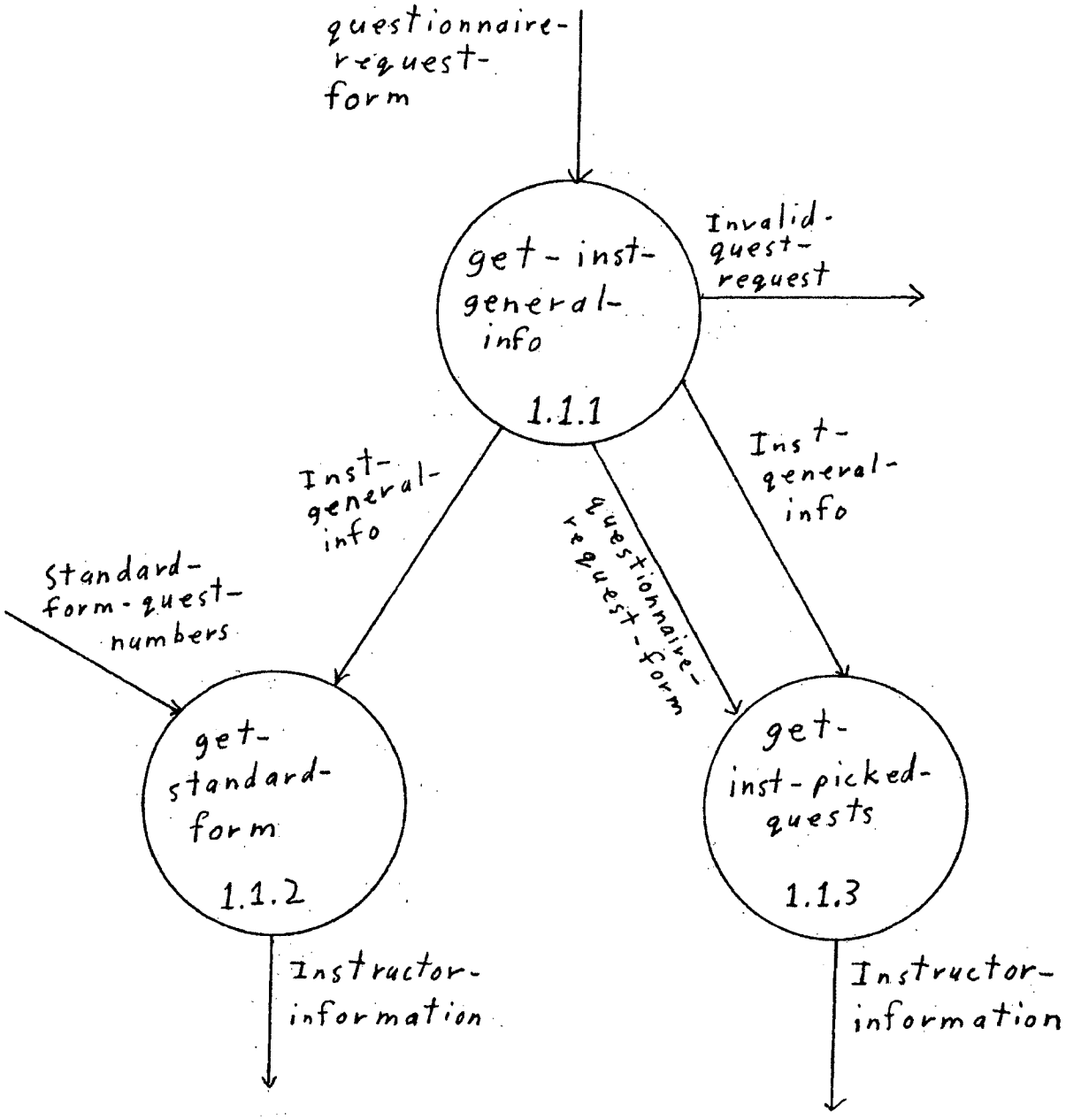
Formatted Problem Statement

```
337 questionnaire forms.;
338     TRACE-KEY IS:  'level-1';
339     PART OF:       generate-questionnaire-form;
340     DERIVES:       questionnaire-forms
341       USING:       question-inst-info;
342
343 EOF EOF EOF EOF EOF
```

Index

Index

Diagram 1.1


questionnaire-request-form
get-inst-general-info
1.1.1
Invalid-quest-request
Inst-general-info
Inst-general-info
questionnaire-request-form
Standard-form-quest-numbers
get-standard-form
1.1.2
get-inst-picked-quests
1.1.3
Instructor-information
Instructor-information

LOGICAL-SYSTEM

Name Selection

Parameters: DB=LOGIC.DBF PRINT PUNCH=PSANAM.TMP EMPTY
SELECTION='TKEY="level-1.1"' ORDER=BYTYPE

1	course-number	ELEMENT
2	department-abbreviation	ELEMENT
3	department-number	ELEMENT
4	form-number	ELEMENT
5	instructor-picked-quest-num	ELEMENT
6	instructors-first-init	ELEMENT
7	instructors-last-name	ELEMENT
8	num-quest-copies-request	ELEMENT
9	question-numbers	ELEMENT
10	section-number	ELEMENT
11	inst-general-info	ENTITY
12	instructor-information	ENTITY
13	standard-form-quest-numbers	ENTITY
14	questionnaire-request-form	INPUT
15	invalid-quest-request	OUTPUT
16	get-inst-general-info	PROCESS
17	get-inst-picked-quests	PROCESS
18	get-standard-form	PROCESS

Formatted Problem Statement

```
Parameters:   DB=LOGIC.DBF  FILE=PSANAM.TMP  INDEX
  NOPUNCHED-NAMES  PRINT  NOPUNCH  SMARG=5  NMARG=20  AMARG=10
  BMARG=25  RNMARG=60  CMARG=1  HMARG=23  ONE-PER-LINE
  COMMENT  NONEW-PAGE  NONEW-LINE  NOALL-STATEMENTS
  COMPLEMENTARY-STATEMENTS  LINE-NUMBERS  PRINTEOF
  DLC-COMMENT  NOSORT-NAME-LIST

  1 DEFINE ELEMENT        course-number;
  2      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
  3     DESCRIPTION;
  4    A University course number.;
  5     TRACE-KEY IS:  'level-0',
  6                    'level-1',
  7                    'level-1.1',
  8                    'level-2';
  9     CONTAINED IN:  instructor-information,
 10                    inst-general-info,
 11                    question-inst-info,
 12                    questionnaire-request-form,
 13                    global-questionnaire-report,
 14                    personal-questionnaire-report,
 15                    questionnaire-forms,
 16                    questionnaire-answers;
 17     VALUES ARE:
 18          1 THRU         999;
 19
 20 DEFINE ELEMENT        department-abbreviation;
 21      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 22     DESCRIPTION;
 23    The department abbreviation is a character string
 24 of letters.  The length of the string is between 0 and
 25 5 characters.;
 26     TRACE-KEY IS:  'level-0',
 27                    'level-1',
 28                    'level-1.1',
 29                    'level-2';
 30     CONTAINED IN:  instructor-information,
 31                    inst-general-info,
 32                    question-inst-info,
 33                    questionnaire-request-form,
 34                    global-questionnaire-report,
 35                    personal-questionnaire-report,
 36                    questionnaire-forms;
 37
 38 DEFINE ELEMENT        department-number;
 39      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 40     DESCRIPTION;
 41    The department number is a number used to identify
 42 a particular university department.;
```

Formatted Problem Statement

```
 43     TRACE-KEY IS:  'level-0',
 44                    'level-1',
 45                    'level-1.1',
 46                    'level-2';
 47     CONTAINED IN:  instructor-information,
 48                    inst-general-info,
 49                    question-inst-info,
 50                    questionnaire-request-form,
 51                    global-questionnaire-report,
 52                    personal-questionnaire-report,
 53                    questionnaire-forms,
 54                    questionnaire-answers;
 55     VALUES ARE:
 56          1 THRU         9999;
 57
 58 DEFINE ELEMENT        form-number;
 59      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 60     DESCRIPTION;
 61    The form number is used to obtain the question numbers
 62 for questions in a given standard form.  The standard for...
 63 be a list of up to 23 question numbers.;
 64     TRACE-KEY IS:  'level-0',
 65                    'level-1',
 66                    'level-1.1';
 67     CONTAINED IN:  inst-general-info,
 68                    questionnaire-request-form,
 69                    valid-idp-updates,
 70                    standard-form-quest-numbers;
 71     VALUES ARE:
 72          1 THRU         999;
 73
 74 DEFINE ELEMENT        instructor-picked-quest-num;
 75      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 76     DESCRIPTION;
 77    The instructor picked question numbers are a list of
 78 numbers to questions in the question data base.  The inst...
 79 chooses up to 23 questions from the data base and enters ...
 80 numbers on his request form.;
 81     TRACE-KEY IS:  'level-0',
 82                    'level-1',
 83                    'level-1.1',
 84                    'level-2';
 85     CONTAINED IN:  instructor-information,
 86                    question-inst-info,
 87                    questionnaire-request-form;
 88
 89 DEFINE ELEMENT        instructors-first-init;
 90      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 91     TRACE-KEY IS:  'level-0',
```

Formatted Problem Statement

```
                    'level-1',
                    'level-1.1',
                    'level-2';
    CONTAINED IN:   instructor-information,
                    inst-general-info,
                    question-inst-info,
                    questionnaire-request-form,
                    global-questionnaire-report,
                    personal-questionnaire-report,
                    questionnaire-forms;

DEFINE ELEMENT          instructors-last-name;
     /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
    DESCRIPTION;
   The instructor's name is the first 14 characters in
his last name.;
    TRACE-KEY IS:   'level-0',
                    'level-1',
                    'level-1.1',
                    'level-2';
    CONTAINED IN:   instructor-information,
                    inst-general-info,
                    question-inst-info,
                    questionnaire-request-form,
                    global-questionnaire-report,
                    personal-questionnaire-report,
                    questionnaire-forms;

DEFINE ELEMENT          num-quest-copies-request;
     /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
    DESCRIPTION;
   The number of questionnaire copies are the number of
forms that are requested to be printed.;
    TRACE-KEY IS:   'level-0',
                    'level-1',
                    'level-1.1';
    CONTAINED IN:   instructor-information,
                    inst-general-info,
                    question-inst-info,
                    questionnaire-request-form;

DEFINE ELEMENT          question-numbers;
     /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
    DESCRIPTION;
   The question numbers are the numbers for the questions
in the data base.;
    TRACE-KEY IS:   'level-0',
                    'level-1.1',
                    'level-3';
```

Formatted Problem Statement

```
141      CONTAINED IN:  dept-quest-list,
142                     valid-idp-updates,
143                     standard-form-quest-numbers;
144      VALUES ARE:
145           1 THRU          9999;
146
147  DEFINE ELEMENT          section-number;
148       /*   DATE OF LAST CHANGE - Apr 21, 1983, 22:55:36 */
149      DESCRIPTION;
150     The section number is the section number for a given
151  university course.;
152      TRACE-KEY IS:  'level-0',
153                     'level-1',
154                     'level-1.1',
155                     'level-2';
156      CONTAINED IN:  instructor-information,
157                     inst-general-info,
158                     question-inst-info,
159                     questionnaire-request-form,
160                     global-questionnaire-report,
161                     personal-questionnaire-report,
162                     questionnaire-forms,
163                     questionnaire-answers;
164      VALUES ARE:
165           1 THRU          999;
166
167  DEFINE ENTITY           inst-general-info;
168       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
169      TRACE-KEY IS:  'level-1.1';
170      CONSISTS OF:
171           course-number,
172           department-abbreviation,
173           department-number,
174           form-number,
175           instructors-first-init,
176           instructors-last-name,
177           num-quest-copies-request,
178           section-number;
179      DERIVED BY:    get-inst-general-info
180        USING:       questionnaire-request-form;
181      USED BY:
182           get-inst-picked-quests
183            TO DERIVE     instructor-information;
184      USED BY:
185           get-standard-form
186            TO DERIVE     instructor-information;
187
188  DEFINE ENTITY          instructor-information;
189       /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
```

Formatted Problem Statement

```
190     TRACE-KEY IS:  'level-0',
191                    'level-1',
192                    'level-1.1';
193     CONSISTS OF:
194          course-number,
195          department-abbreviation,
196          department-number,
197          instructor-picked-quest-num,
198          instructors-first-init,
199          instructors-last-name,
200          num-quest-copies-request,
201          section-number;
202     DERIVED BY:    generate-questionnaire-form
203       USING:       question-inst-info,
204                    questionnaire-request-form;
205     DERIVED BY:    get-standard-form
206       USING:       standard-form-quest-numbers,
207                    inst-general-info;
208     DERIVED BY:    create-instructor-database
209       USING:       questionnaire-request-form;
210     DERIVED BY:    get-inst-picked-quests
211       USING:       inst-general-info,
212                    questionnaire-request-form;
213     USED BY:
214          generate-questionnaire-form
215           TO UPDATE     ices-data-pool;
216
217 DEFINE ENTITY         standard-form-quest-numbers;
218      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
219     DESCRIPTION;
220    The standard form question numbers consist of a
221 list of all possible forms.  Each form has a form number
222 and a list of up to 23 numbers of questions from the data
223 base of questions.;
224     TRACE-KEY IS:  'level-1.1';
225     COLLECTED IN:  ices-data-pool;
226     CONSISTS OF:
227          form-number,
228          question-numbers;
229     USED BY:
230          get-standard-form
231           TO DERIVE     instructor-information;
232
233 DEFINE INPUT          questionnaire-request-form;
234      /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
235     TRACE-KEY IS:  'level-0',
236                    'level-1',
237                    'level-1.1';
238     GENERATED:      BY instructor;
```

Formatted Problem Statement

```
239     CONSISTS OF:
240          course-number,
241          department-abbreviation,
242          department-number,
243          form-number,
244          instructor-picked-quest-num,
245          instructors-first-init,
246          instructors-last-name,
247          num-quest-copies-request,
248          section-number;
249     USED BY:
250          generate-questionnaire-form
251           TO DERIVE     questionnaire-forms;
252     USED BY:
253          create-instructor-database
254           TO DERIVE     invalid-quest-request;
255     USED BY:
256          create-instructor-database
257           TO DERIVE     instructor-information;
258     USED BY:
259          generate-questionnaire-form
260           TO DERIVE     instructor-information;
261     USED BY:
262          generate-questionnaire-form
263           TO DERIVE     invalid-quest-request;
264     USED BY:
265          get-inst-general-info
266           TO DERIVE     inst-general-info;
267     USED BY:
268          get-inst-general-info
269           TO DERIVE     invalid-quest-request;
270     USED BY:
271          get-inst-picked-quests
272           TO DERIVE     instructor-information;
273
274 DEFINE OUTPUT          invalid-quest-request;
275      /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
276     TRACE-KEY IS:  'level-0',
277                    'level-1',
278                    'level-1.1';
279     RECEIVED:       BY instructor;
280     DERIVED BY:    generate-questionnaire-form
281       USING:       question-inst-info,
282                    questionnaire-request-form;
283     DERIVED BY:    create-instructor-database
284       USING:       questionnaire-request-form;
285     DERIVED BY:    get-inst-general-info
286       USING:       questionnaire-request-form;
287
```

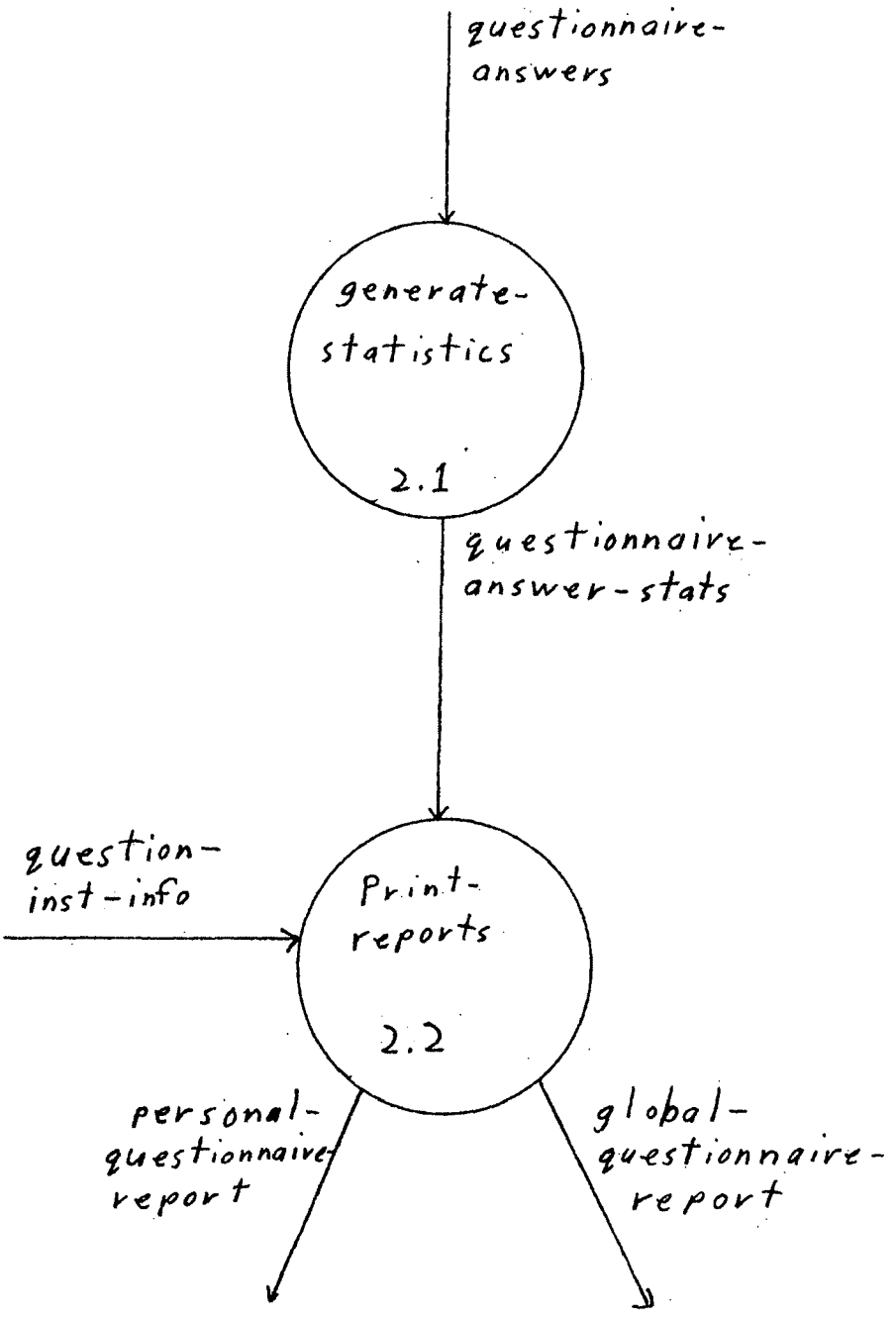
Formatted Problem Statement

```
 288 DEFINE PROCESS        get-inst-general-info;
 289      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 290     SYNONYMS ARE:  dfdl.1.1;
 291     DESCRIPTION;
 292    This process will accept the information about the
 293 instructor.  This is all of the information except the
 294 infromation about the questions.;
 295     TRACE-KEY IS:  'level-1.1';
 296     PART OF:       create-instructor-database;
 297     DERIVES:       inst-general-info
 298       USING:       questionnaire-request-form;
 299     DERIVES:       invalid-quest-request
 300       USING:       questionnaire-request-form;
 301
 302 DEFINE PROCESS        get-inst-picked-quests;
 303      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 304     SYNONYMS ARE:  dfdl.1.3;
 305     DESCRIPTION;
 306    This routine will read in the questions that the
 307 instructor put on the questionnaire request form.;
 308     TRACE-KEY IS:  'level-1.1';
 309     PART OF:       create-instructor-database;
 310     DERIVES:       instructor-information
 311       USING:       inst-general-info,
 312                    questionnaire-request-form;
 313
 314 DEFINE PROCESS        get-standard-form;
 315      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 316     SYNONYMS ARE:  dfdl.1.2;
 317     DESCRIPTION;
 318    This process will convert the given standard form
 319 number into a list of question numbers to be put into the
 320 instructor's information.;
 321     TRACE-KEY IS:  'level-1.1';
 322     PART OF:       create-instructor-database;
 323     DERIVES:       instructor-information
 324       USING:       standard-form-quest-numbers,
 325                    inst-general-info;
 326
 327 EOF EOF EOF EOF EOF
```

Index

Index

Diagram 2


questionnaire-answers
generate-statistics
2.1
questionnaire-answer-stats
question-inst-info
Print-reports
2.2
personal-questionnaire-report
global-questionnaire-report

LOGICAL-SYSTEM

Name Selection

Parameters: DB=LOGIC.DBF PRINT PUNCH=PSANAM.TMP EMPTY
SELECTION='TKEY="level-2"' ORDER=BYTYPE

1	course-number	ELEMENT
2	department-abbreviation	ELEMENT
3	department-number	ELEMENT
4	frequency-of-answers	ELEMENT
5	instructor-picked-quest-num	ELEMENT
6	instructors-first-init	ELEMENT
7	instructors-last-name	ELEMENT
8	mean-of-answers	ELEMENT
9	question-answers	ELEMENT
10	section-number	ELEMENT
11	selected-questions	ELEMENT
12	standard-dev-of-answers	ELEMENT
13	question-inst-info	ENTITY
14	questionnaire-answer-stats	ENTITY
15	questionnaire-answers	INPUT
16	global-questionnaire-report	OUTPUT
17	personal-questionnaire-report	OUTPUT
18	generate-statistics	PROCESS
19	print-reports	PROCESS

Formatted Problem Statement

```
Parameters:   DB=LOGIC.DBF  FILE=PSANAM.TMP  INDEX
  NOPUNCHED-NAMES  PRINT  NOPUNCH  SMARG=5  NMARG=20  AMARG=10
  BMARG=25  RNMARG=60  CMARG=1  HMARG=23  ONE-PER-LINE
  COMMENT  NONEW-PAGE  NONEW-LINE  NOALL-STATEMENTS
  COMPLEMENTARY-STATEMENTS  LINE-NUMBERS  PRINTEOF
  DLC-COMMENT  NOSORT-NAME-LIST

  1 DEFINE ELEMENT        course-number;
  2      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
  3     DESCRIPTION;
  4    A University course number.;
  5     TRACE-KEY IS:  'level-0',
  6                    'level-1',
  7                    'level-1.1',
  8                    'level-2';
  9     CONTAINED IN:  instructor-information,
 10                    inst-general-info,
 11                    question-inst-info,
 12                    questionnaire-request-form,
 13                    global-questionnaire-report,
 14                    personal-questionnaire-report,
 15                    questionnaire-forms,
 16                    questionnaire-answers;
 17     VALUES ARE:
 18          1 THRU         999;
 19
 20 DEFINE ELEMENT        department-abbreviation;
 21      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 22     DESCRIPTION;
 23    The department abbreviation is a character string
 24 of letters.  The length of the string is between 0 and
 25 5 characters.;
 26     TRACE-KEY IS:  'level-0',
 27                    'level-1',
 28                    'level-1.1',
 29                    'level-2';
 30     CONTAINED IN:  instructor-information,
 31                    inst-general-info,
 32                    question-inst-info,
 33                    questionnaire-request-form,
 34                    global-questionnaire-report,
 35                    personal-questionnaire-report,
 36                    questionnaire-forms;
 37
 38 DEFINE ELEMENT        department-number;
 39      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 40     DESCRIPTION;
 41    The department number is a number used to identify
 42 a particular university department.;
```

Formatted Problem Statement

```
43      TRACE-KEY IS:  'level-0',
44                     'level-1',
45                     'level-1.1',
46                     'level-2';
47      CONTAINED IN:  instructor-information,
48                     inst-general-info,
49                     question-inst-info,
50                     questionnaire-request-form,
51                     global-questionnaire-report,
52                     personal-questionnaire-report,
53                     questionnaire-forms,
54                     questionnaire-answers;
55      VALUES ARE:
56          1 THRU         9999;
57
58  DEFINE ELEMENT        frequency-of-answers;
59       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
60      DESCRIPTION;
61     The frequency of the answers is a list of the number
62  of occurances for each answer to a given question.;
63      TRACE-KEY IS:  'level-0',
64                     'level-2';
65      CONTAINED IN:  questionnaire-answer-stats,
66                     global-questionnaire-report,
67                     personal-questionnaire-report;
68
69  DEFINE ELEMENT        instructor-picked-quest-num;
70       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
71      DESCRIPTION;
72     The instructor picked question numbers are a list of
73  numbers to questions in the question data base.  The inst...
74  chooses up to 23 questions from the data base and enters ...
75  numbers on his request form.;
76      TRACE-KEY IS:  'level-0',
77                     'level-1',
78                     'level-1.1',
79                     'level-2';
80      CONTAINED IN:  instructor-information,
81                     question-inst-info,
82                     questionnaire-request-form;
83
84  DEFINE ELEMENT        instructors-first-init;
85       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
86      TRACE-KEY IS:  'level-0',
87                     'level-1',
88                     'level-1.1',
89                     'level-2';
90      CONTAINED IN:  instructor-information,
91                     inst-general-info,
```

Formatted Problem Statement

```
                    question-inst-info,
                    questionnaire-request-form,
                    global-questionnaire-report,
                    personal-questionnaire-report,
                    questionnaire-forms;

DEFINE ELEMENT        instructors-last-name;
     /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
    DESCRIPTION;
   The instructor's name is the first 14 characters in
his last name.;
    TRACE-KEY IS:  'level-0',
                   'level-1',
                   'level-1.1',
                   'level-2';
    CONTAINED IN:  instructor-information,
                   inst-general-info,
                   question-inst-info,
                   questionnaire-request-form,
                   global-questionnaire-report,
                   personal-questionnaire-report,
                   questionnaire-forms;

DEFINE ELEMENT        mean-of-answers;
     /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
    DESCRIPTION;
   The mean of answers will consist of two parts.
The first part is the mean of the answers to a particular
question.  The second part is a written description telling
weather the mean is high, high average, average, low
average, or low.  The second part was added to help
instructors interprete the results.;
    TRACE-KEY IS:  'level-0',
                   'level-2';
    CONTAINED IN:  questionnaire-answer-stats,
                   global-questionnaire-report,
                   personal-questionnaire-report;

DEFINE ELEMENT        question-answers;
     /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
    DESCRIPTION;
   This is a list of symbols telling which answers
were picked for the questions in the questionnaire.;
    TRACE-KEY IS:  'level-0',
                   'level-2';
    CONTAINED IN:  questionnaire-answers;

DEFINE ELEMENT        section-number;
     /*   DATE OF LAST CHANGE - Apr 21, 1983, 22:55:36 */
```

Formatted Problem Statement

```
141     DESCRIPTION;
142    The section number is the section number for a given
143 university course.;
144     TRACE-KEY IS:  'level-0',
145                    'level-1',
146                    'level-1.1',
147                    'level-2';
148     CONTAINED IN:  instructor-information,
149                    inst-general-info,
150                    question-inst-info,
151                    questionnaire-request-form,
152                    global-questionnaire-report,
153                    personal-questionnaire-report,
154                    questionnaire-forms,
155                    questionnaire-answers;
156     VALUES ARE:
157          1 THRU         999;
158
159 DEFINE ELEMENT        selected-questions;
160      /*   DATE OF LAST CHANGE - Apr 21, 1983, 22:55:36 */
161     DESCRIPTION;
162    The selected questions are a list of up to
163 23 question numbers.  These will be used to obtain the
164 corresponding questions from the data base.  The questions
165 are either instructor picked or standard form questions.;
166     TRACE-KEY IS:  'level-0',
167                    'level-1',
168                    'level-2';
169     CONTAINED IN:  question-inst-info,
170                    questionnaire-forms,
171                    personal-questionnaire-report;
172
173 DEFINE ELEMENT        standard-dev-of-answers;
174      /*   DATE OF LAST CHANGE - Apr 21, 1983, 22:55:36 */
175     DESCRIPTION;
176    The standard deviation of the answers is in two
177 parts.  The first part lists the standard deviation of
178 a particular question.  The second part uses the standard
179 deviation to list weather the consensus on the answer was,
180 high, average, or low.;
181     TRACE-KEY IS:  'level-0',
182                    'level-2';
183     CONTAINED IN:  questionnaire-answer-stats,
184                    global-questionnaire-report,
185                    personal-questionnaire-report;
186
187 DEFINE ENTITY         question-inst-info;
188      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
189     TRACE-KEY IS:  'level-0',
```

Formatted Problem Statement

```
190                    'level-1',
191                    'level-2';
192      COLLECTED IN:  ices-data-pool;
193      CONSISTS OF:
194           course-number,
195           department-abbreviation,
196           department-number,
197           instructor-picked-quest-num,
198           instructors-first-init,
199           instructors-last-name,
200           num-quest-copies-request,
201           section-number,
202           selected-questions;
203      USED BY:
204           generate-questionnaire-form
205            TO DERIVE      instructor-information;
206      USED BY:
207           generate-questionnaire-form
208            TO DERIVE      invalid-quest-request;
209      USED BY:
210           generate-questionnaire-form
211            TO DERIVE      questionnaire-forms;
212      USED BY:
213           report-generation
214            TO DERIVE      personal-questionnaire-report;
215      USED BY:
216           report-generation
217            TO DERIVE      global-questionnaire-report;
218      USED BY:
219           questionnaire-print-routine
220            TO DERIVE      questionnaire-forms;
221      USED BY:
222           print-reports
223            TO DERIVE      personal-questionnaire-report;
224      USED BY:
225           print-reports
226            TO DERIVE      global-questionnaire-report;
227
228 DEFINE ENTITY          questionnaire-answer-stats;
229       /*   DATE OF LAST CHANGE - Apr 21, 1983, 22:59:46 */
230      TRACE-KEY IS:  'level-2';
231      CONSISTS OF:
232           frequency-of-answers,
233           mean-of-answers,
234           standard-dev-of-answers;
235      DERIVED BY:    generate-statistics
236        USING:       questionnaire-answers;
237      USED BY:
238           print_reports
```

Formatted Problem Statement

```
239           TO DERIVE     personnal-questionnaire-report;
240      USED BY:
241           print_reports
242           TO DERIVE     global-questionnaire-report;
243
244 DEFINE INPUT          questionnaire-answers;
245       /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
246      TRACE-KEY IS:  'level-0',
247                     'level-2';
248      GENERATED:      BY students;
249      CONSISTS OF:
250           course-number,
251           department-number,
252           question-answers,
253           section-number;
254      USED BY:
255           generate-statistics
256           TO DERIVE     questionnaire-answer-stats;
257      USED BY:
258           report-generation
259           TO DERIVE     personal-questionnaire-report;
260      USED BY:
261           report-generation
262           TO DERIVE     global-questionnaire-report;
263
264 DEFINE OUTPUT         global-questionnaire-report;
265       /*   DATE OF LAST CHANGE - Apr 21, 1983, 22:59:46 */
266      DESCRIPTION;
267     The global questionnaire report will contain
268 the general information about the instructor.  The questions
269 that will be in the report will be the demographic questions
270 about the students and the general questions about the
271 instructor.  The report will also list the frequency of
272 the quesion answers, and the mean and standard deviation
273 for each question.;
274      TRACE-KEY IS:  'level-0',
275                     'level-2';
276      RECEIVED:       BY faculty-evaluation-committee;
277      CONSISTS OF:
278           course-number,
279           department-abbreviation,
280           department-number,
281           frequency-of-answers,
282           instructors-first-init,
283           instructors-last-name,
284           mean-of-answers,
285           section-number,
286           standard-dev-of-answers;
287      DERIVED BY:   report-generation
```

Formatted Problem Statement

```
288       USING:        question-inst-info,
289                     questionnaire-answers;
290     DERIVED BY:     print-reports
291       USING:        question-inst-info;
292     DERIVED BY:     print_reports
293       USING:        questionnaire-answer-stats;
294
295 DEFINE OUTPUT          personal-questionnaire-report;
296      /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
297     DESCRIPTION;
298    The personal questionnaire report will contain the
299 instructor's general information. The questions that will
300 be listed in the report are the demographic questions about
301 the students, the general questions about the instructor,
302 and the instructor's picked questions. For each question
303 a frequency of the occurance of the answers will be given,
304 along with the mean and standard deviation of the question.
305 A written description of the mean and standard deviation ...
306 be given to help the instructor interpret the results.;
307     TRACE-KEY IS:  'level-0',
308                    'level-2';
309     RECEIVED:       BY instructor;
310     CONSISTS OF:
311          course-number,
312          department-abbreviation,
313          department-number,
314          frequency-of-answers,
315          instructors-first-init,
316          instructors-last-name,
317          mean-of-answers,
318          section-number,
319          selected-questions,
320          standard-dev-of-answers;
321     DERIVED BY:     report-generation
322       USING:        question-inst-info,
323                     questionnaire-answers;
324     DERIVED BY:     print-reports
325       USING:        question-inst-info;
326
327 DEFINE PROCESS          generate-statistics;
328      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
329     SYNONYMS ARE:  dfd2.1;
330     DESCRIPTION;
331    This routine will generate the frequency, mean, and
332 standard deviation of the answers to the questions.;
333     TRACE-KEY IS:  'level-2';
334     PART OF:       report-generation;
335     DERIVES:       questionnaire-answer-stats
336       USING:       questionnaire-answers;
```

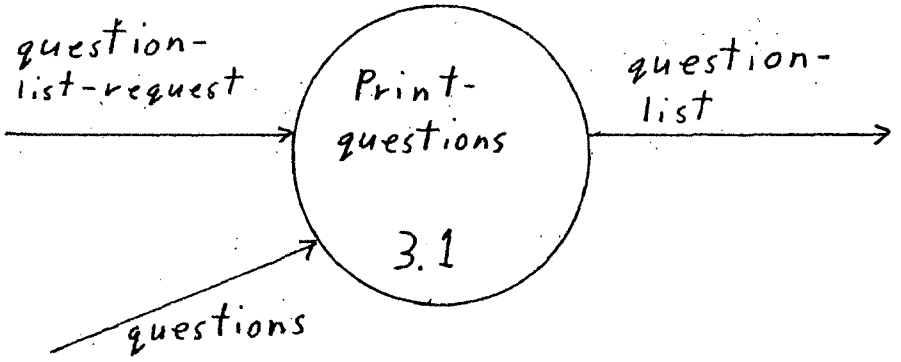
Formatted Problem Statement

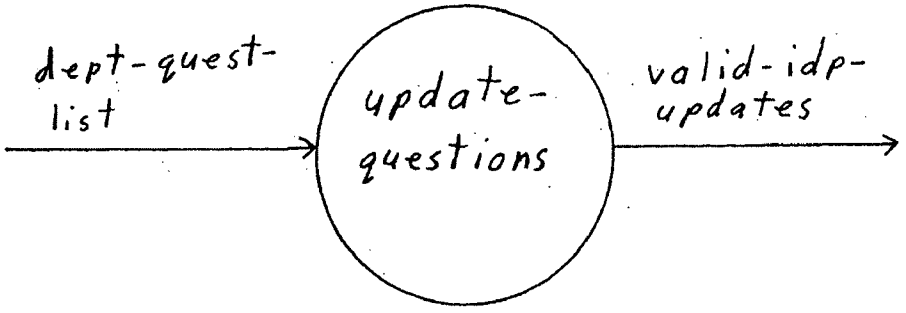
```
337
338 DEFINE PROCESS        print-reports;
339       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
340     SYNONYMS ARE:  dfd2.2;
341     DESCRIPTION;
342    This routine will generate the reports for the
343 instructor and the faculty evaluation committee.;
344     TRACE-KEY IS:  'level-2';
345     PART OF:       report-generation;
346     DERIVES:       personal-questionnaire-report
347       USING:       question-inst-info;
348     DERIVES:       global-questionnaire-report
349       USING:       question-inst-info;
350
351 EOF EOF EOF EOF EOF
```

Index

Index

Diagram 3


question-
list-request
Print-
questions
3.1
question-
list
questions


dept-quest-
list
update-
questions
valid-idp-
updates

LOGICAL-SYSTEM

Name Selection

Parameters: DB=LOGIC.DBF PRINT PUNCH=PSANAM.TMP EMPTY
SELECTION='TKEY="level-3"' ORDER=BYTYPE

1	list-of-all-questions	ELEMENT
2	question-numbers	ELEMENT
3	standard-forms-list	ELEMENT
4	questions	ENTITY
5	valid-idp-updates	ENTITY
6	dept-quest-list	INPUT
7	question-list-request	INPUT
8	question-list	OUTPUT
9	print-questions	PROCESS
10	update-questions	PROCESS

Formatted Problem Statement

```
Parameters:   DB=LOGIC.DBF  FILE=PSANAM.TMP  INDEX
  NOPUNCHED-NAMES  PRINT  NOPUNCH  SMARG=5  NMARG=20  AMARG=10
  BMARG=25  RNMARG=60  CMARG=1  HMARG=23  ONE-PER-LINE
  COMMENT  NONEW-PAGE  NONEW-LINE  NOALL-STATEMENTS
  COMPLEMENTARY-STATEMENTS  LINE-NUMBERS  PRINTEOF
  DLC-COMMENT  NOSORT-NAME-LIST

  1 DEFINE ELEMENT        list-of-all-questions;
  2      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
  3     DESCRIPTION;
  4    This is a list of all of the questions that are
  5 kept in the data base.  The questions are in three parts,
  6 a question number, and two string parts each containing
  7 half of a question.;
  8     TRACE-KEY IS:  'level-0',
  9                    'level-3';
 10     CONTAINED IN:  questions,
 11                    question-list;
 12
 13 DEFINE ELEMENT        question-numbers;
 14      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 15     DESCRIPTION;
 16    The question numbers are the numbers for the questions
 17 in the data base.;
 18     TRACE-KEY IS:  'level-0',
 19                    'level-1.1',
 20                    'level-3';
 21     CONTAINED IN:  dept-quest-list,
 22                    valid-idp-updates,
 23                    standard-form-quest-numbers;
 24     VALUES ARE:
 25          1 THRU         9999;
 26
 27 DEFINE ELEMENT        standard-forms-list;
 28      /*   DATE OF LAST CHANGE - Apr 21, 1983, 22:55:36 */
 29     DESCRIPTION;
 30    This form will be a list of all standard forms
 31 currently in the data base.  It will list out the questions
 32 in each of the standard forms.;
 33     TRACE-KEY IS:  'level-0',
 34                    'level-3';
 35     CONTAINED IN:  questions,
 36                    question-list;
 37
 38 DEFINE ENTITY         questions;
 39      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 40     TRACE-KEY IS:  'level-0',
 41                    'level-3';
 42     COLLECTED IN:  ices-data-pool;
```

Formatted Problem Statement

```
43      CONSISTS OF:
44           list-of-all-questions,
45           standard-forms-list;
46      USED BY:
47           database-maintainance
48            TO DERIVE     question-list;
49      USED BY:
50           print-questions
51            TO DERIVE     question-list;
52
53 DEFINE ENTITY          valid-idp-updates;
54       /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
55      TRACE-KEY IS:  'level-0',
56                     'level-3';
57      CONSISTS OF:
58           form-number,
59           question-numbers;
60      DERIVED BY:    database-maintainance
61        USING:       dept-quest-list;
62      DERIVED BY:    update-questions
63        USING:       dept-quest-list;
64      USED BY:
65           database-maintainance
66            TO UPDATE     ices-data-pool;
67
68 DEFINE INPUT           dept-quest-list;
69       /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
70      TRACE-KEY IS:  'level-0',
71                     'level-3';
72      GENERATED:      BY faculty-evaluation-committee;
73      CONSISTS OF:
74           question-numbers;
75      USED BY:
76           database-maintainance
77            TO DERIVE     valid-idp-updates;
78      USED BY:
79           update-questions
80            TO DERIVE     valid-idp-updates;
81
82 DEFINE INPUT           question-list-request;
83       /*   DATE OF LAST CHANGE - Apr 21, 1983, 20:26:30 */
84      TRACE-KEY IS:  'level-0',
85                     'level-3';
86      GENERATED:      BY instructor;
87      USED BY:
88           database-maintainance
89            TO DERIVE     question-list;
90      USED BY:
91           print-questions
```

Formatted Problem Statement

```
 92          TO DERIVE     question-list;
 93
 94 DEFINE OUTPUT          question-list;
 95      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
 96     TRACE-KEY IS:  'level-0',
 97                    'level-3';
 98     RECEIVED:       BY instructor;
 99     CONSISTS OF:
100          list-of-all-questions,
101          standard-forms-list;
102     DERIVED BY:    database-maintainance
103       USING:       questions,
104                    question-list-request;
105     DERIVED BY:    print-questions
106       USING:       questions,
107                    question-list-request;
108
109 DEFINE PROCESS         print-questions;
110      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
111     SYNONYMS ARE:  dfd3.1;
112     DESCRIPTION;
113    This routine will print out a list of all the questions
114 in the question data base.;
115     TRACE-KEY IS:  'level-3';
116     PART OF:       database-maintainance;
117     DERIVES:       question-list
118       USING:       questions,
119                    question-list-request;
120
121 DEFINE PROCESS         update-questions;
122      /*   DATE OF LAST CHANGE - Apr 21, 1983, 19:37:15 */
123     SYNONYMS ARE:  dfd3.2;
124     DESCRIPTION;
125    This routine will create new standard forms for the
126 departments requesting them.;
127     TRACE-KEY IS:  'level-3';
128     PART OF:       database-maintainance;
129     DERIVES:       valid-idp-updates
130       USING:       dept-quest-list;
131
132 EOF EOF EOF EOF EOF
```

Index

APPENDIX D

PROGRAM DOCUMENTATION

Design document for the first part of the
Faculty Evaluation System.

1) Generate questionnaire forms

Description:
The first part of the faculty evaluation system generates the questionnaire forms for the instructor. The instructor picks the questions from a given data base of questions.

Input:
A list of the questions in the data base along with the standard forms are distributed to each department. The instructor returns a form with his general information, and a list of question numbers which reference the question data base, to data entry personnel who enter the information into the data base containing instructor's information.

Output:
The number of copies of the questions that were requested. Global questions are preprinted on the forms. The output format is set to print on the scantron faculty evaluation forms.
A command file is created to print out the questionnaires for each instructor.

Algorithm:
1) build instructor data base
2) print evaluation questionnaires

1.1) Create Instructor Data Base

Description:

This process will display a menu of options for modifications to the instructor data base. The process will then call the appropriate procedure to perform the task. This routine allows the user to add, delete, and print records from the instructor data base. The routine will also automatically back up the instructor data base after every ten changes made to it.

Input:
Instructor request form:

```
Instructor's name : a string of up to 14 characters
first initial     : character
Department abbreviation : string of up to 5 characters
Department number : integer number (0<=n<=9999)
Course number     : integer number (0<=n<=999)
Course section number : integer number (0<=n<=999)
Print flag        : char
Number of questionnaires requested : integer number
                                     (0<=n<=999)
Form number       : integer number (0<=n<=9999)
instructor picked questions : list of question numbers
                              (0<=n<=23)
        question numbers : integer number (0<=n<=9999)
```

Output:

```
Instructor's name : array [1..14] of char;
first initial     : char;
Department abbreviation : array [1..5] of char;
Department number : array [1..4] of char;
Course number     : array [1..3] of char;
Course section number : array [1..3] of char;
Print flag        : char
Number of questionnaires requested : array [1..3] of
                                     char;
Form number       : array [1..4] of char;
instructor picked questions : array [1..23] of
                              question numbers;
        question numbers : array [1..4] of char;
```

The following subroutines are called by this procedure:

- get_forms - gets standard forms
- get_instruct_info - reads in the instructor data base
- heading - print program heading
- reset_files - updates the instructor file
- add_inst - adds and instructor record
- delete_inst - deletes and instructor record
- print_inst - prints a list of all instructors in the data base.
- dump_inst - writes the instructor information to a file

1.1.1) get_forms

Description:
This routine reads in the standard questionnaire records innto a linked list. Each standard questionnaire record consist of a form number and 23 question numbers

input:
a file of standard forms

output:
a linked list of standard forms.
each record consists of the following:

```
form_num : packed array [1..4] of char;
quest_nums : array [1..23] of key_type
```

where key_type is a packed array [1..4] of char.

This routine is called by :
the main routine

1.1.2) get_instruct_info

Description:
This routine reads in the instructor data base into a linked list from a file.

Input:
head_inst_list : a pointer to the beginning of the list.

Output:
Head_inst_list : a pointer to the head of the list

This routine is called by:
the main routine
This routine call:
get_rec

1.1.2.1) get_rec

Description:
This routine reads in an instructor record for the instructor data base file.

Input:
Instructor's name : a string of up to 14 characters
first initial : character
Department abbreviation : string of up to 5 characters
Department number : integer number (0<=n<=9999)
Course number : integer number (0<=n<=999)
Course section number : integer number (0<=n<=999)
Print flag : char
Number of questionnaires requested : integer number

(0<=n<=999)
Form number : integer number (0<=n<=9999)
instructor picked questions : list of question numbers
(0<=n<=23)
question numbers : integer number (0<=n<=9999)

Output:
The output is the same as the input exept the information is in a linked list

This routine is called by:
get_instruct_info

1.1.3) heading

Description:
This routine prints the program heading and the menu of options onto the screen.

1.1.4) reset_files

Description:
This routine is called after 10 changes have been made to the instructor data base. The routine calls dump_inst to write the innstructor records to a file.

Input:
head_inst : a pointer to the head of the instructor list

Output:
none

This routine is called by:
the main routine
This routine calls:
dump_inst

1.1.4.1) dump_inst

Description:
This routine writes the updated instructor records to a file.

Input:
head_inst: a pointer to the beginning of the instructor list.

Output:
A file containing the instructor records

The routine is called by:
reset_files
the main routine

1.1.5) add_inst

Description:
This routine will read in the information about the instructor and read in either the form or question numbers that he selected. It will also allow the information to be reviewed before accepting it. This routine calls the appropriate subroutine to read in each of the fields in the instructor record so that all input is parsed.

Input:
Instructor request form:

```
Instructor's name : a string of up to 14 characters
first initial     : character
Department abbreviation : string of up to 5 characters
Department number : integer number (0<=n<=9999)
Course number     : integer number (0<=n<=999)
Course section number : integer number (0<=n<=999)
Number of questionnaires requested : integer number
                                     (0<=n<=999)
Form number       : integer number (0<=n<=9999)
instructor picked questions : list of question numbers
                              (0<=n<=23)
        question numbers : integer number (0<=n<=9999)
```

Output:

```
Instructor's name : array [1..14] of char;
first initial     : char;
Department abbreviation : array [1..5] of char;
Department number : array [1..4] of char;
Course number     : array [1..3] of char;
Course section number : array [1..3] of char;
Number of questionnaires requested : array [1..3] of
                                     char;
Form number       : array [1..4] of char;
instructor picked questions : array [1..23] of
                              question numbers;
```

This routine is called by:
the main routine
The routine calls:
get_name - read an instructor's name
get_dept_abr - read in the department abreviation
get_num - read in an integer number
convert4 - convert a number to a [1..4] array
convert3 - convert a number to a [1..3] array
get_picked - read instructor picked questions
forms_quest - read inn questions for a form number

1.1.5.1) get_name

Description:
This routine reads in an instructor name from the terminal. The routine maps all lower case letters to upper case. The routine will only read in characters up to the maximum length of a name.

Input:
characters from the terminal

Output:
name : packed array [1..14] of char;

This routine is called by:
add_inst - add an instructor record
delete_inst - delete an instructor record

1.1.5.2) get_dept_abr

Description:
This routine reads in the department abbreviation from the terminal. The routine maps all lower case letters to upper case letters. The routine will only read in characters up to the maximum length of the department abbreviation.

Input:
characters from the terminal

Output:
dept_abr : packed array [1..5] of char

This routine is called by:
add_inst - add an instructor record

1.1.5.3) get_num

Description:
This routine reads in an integer number from the terminal. The number is read in a character at a time and the number is computed. The routine will only exept valid integer numbers. An error message will be printed for invalid entries and the user will have to enter a new number.

Input:
characters from the terminal

Output :
An integer number

This routine is called by
add_inst - add an instructor record

get_picked - get an instructor picked question number
delete_inst - delete an instructor record

1.1.5.4) convert4

Description:
This routine converts an integer number into an array with a range of four.

Input:
an integer number

Output:
key : packed array [1..4] of char;

This routine is called by:
add_inst - add an instructor record
get_picked - get an instructor picked question number
forms_quest - get standard form question numbers

1.1.5.5) convert3

Description:
This routine converts an integer number into an array with a range of three.

Input:
an integer number

Output:
key : packed array [1..3] of char;

This routine is called by:
add_inst - add an instructor record
delete_inst - delete an instructor record

1.1.5.6) get_picked

Description:
This routine will read in the instructor picked questions. The numbers of the questions are entered. The routine will allow the user to enter a maximum of 23 questions which is the number of questions set for the size of the forms that the questions are printed out on. If the instructor chooses less than 23 questions then the data entry personal can enter a zero as the last question number and the routie will stop.

Input:
question numbers

Output:

A list of question numbers

This routine is called by:
add_inst - add an instructor record
The routine calls:
init_quest - initialize the question list
get_num - get an integer number
convert4 - convert an integer to an array of characters
char_to_dig - convert a array to an integer

1.1.5.6.1) init_quest

Description:
This routine initializes the list of instructor picked questions to be all zeros.

Input:
quests : array [1..23] of question numbers

Output:
quests : array [1..23] of question numbers

This routine is called by:
get_picked_quest - get instructor picked questions

1.1.5.6.2) char_to_dig

Description:
This routine converts an array [1..4] of digits to a integer number.

Input:
key : packed array [1..4] of char

Output:
an integer number

This routine is called by:
get_picked_quest - get instructor picked questions

1.1.5.7) forms_quest

Description:
This routine receives a form number. It looks through the list of forms until it finds the form number. The routine then writes the question numbers from the standard form into the question list in the instructor record.

Input:
Form number : array [1..4] of char;

Output:
standard form question numbers : array [1..23] of question numbers

This routine is called by:
add_inst - add an instructor record
The routine calls:
convert4 - convert an integer number to an array of characters

1.1.6) delete_inst

Description:
This routine allows the user to delete an instructor record. The routine has the user enter the instructor's name and the course that he is teaching. The routine will then display all records that have the information that was given. This routine is good for deleting duplicate records since the user can see both records.

Input:
the instructor's name
the instructor's course number

Output:
updated instructor data base

This routine is called by:
the main routine
This routie calls:
get_name - get a istructor's name
get_num - get a integer number
convert3 - covert a integer number to an array of characters
d_inst - delete an instructor record

1.1.6.1) d_inst

Description:
This routine displays the complete instructor record so that the user can see if the record is to be deleted. If the user chooses to delete the record then the record is removed from the data base.

Input:
inst : the instructor record
character from the terminal

Ouput:
the updated instructor data base

This routie is called by:
delete_inst - delete an instructor record

1.1.7) print_inst

Description:
This routine will create a printable version of the instructor records. It will write headings for the fields at the top and write the records into a formatted output.

Input:
The instructor record list

Output:
A file of instructor records

This routine is called by:
the main routine
This routine calls:
print_heading - prints the page heading
write_line - writes an instructor record

1.1.7.1) print_heading

Description:
This routine writes out the heading for the instructor report file.

Input
page number : integer

Output:
Heading to report file

This routine is called by:
print_inst - print the instructor records

1.1.7.2) write_line

Description:
This routine writes out the complete instructor record to the istructor report file.

Input:
An instructor record

Output:
The instructor record written to the report file

This routine is called by:
print_inst - print the instructor records

The routine calls:
line - write a line of characters

1.1.7.2.1) line

Description:
This routine writes out a string of characters for the specified length.

Input:
ch : char
n : integer

Output:
A string of length n of char ch

This routine is called by:
write_line - write an instructor reco

1.2) Questionnaire Print Routine
The second part of the questionnaire generation routine deals with printing out the questionnaire forms. The questionnaire forms are all special forms. The global information questions and the scantron boxes (for answers) are all printed on the form. This routine will print out the instructor's information and the questions that he picked.

Input:
Data base of instructor information

Output:
The questionnaire form for each instructor in the data base for whom one has not yet been printed.
A control file that will submit a print request for each instructor's questionnaires with the number of copies supplied by the data base and with the appropriate control switches.

The main routine calls:
- init_table - initialize the questions table
- build_question_list - put questions into the table
- get_instruct_info - read instructor information in a linked list
- get_commands - opens the print command file
- print_info - print the questionnaire forms
- dump_inst - write the updated instructor information back to a file.

1.2.1) init_table

Description:
This routine initializes the question table file to be an array of pointers all equal to nil.

Input:
none

Output:
q_tab : array [1.9999] of pointers

This routine is called by:
- the main routine

1.2.2) build_question_list

Description:
This routine reads in the questions from the question data base. The questions are placed into the question table according to there number. All empty spots in the table will have a nil value.

Input:
A file of questions

Output:
q_tab : array [1..9999] of questions

where questions consist of the following
question number : packed array [1..4] of char;
question string 1 : packed array [1..43] of char;
question string 2 : packed array [1..43] of char;

This routine is called by:
the main routine
This routine calls:
get_quest - reads in a question
get_num - converts an array to an integer

1.2.2.1) get_quest

Description:
This routine reads in a question from the quesion data base file.

Input:
A question record

Output:
A pointer to the question record

This routine is called by:
build_question_list - builds the question table

1.2.2.2) get_num

Description:
This routine receives an array of digits and converts them into an integer number:

Input:
key : packed array [1..4] of char;

Output:
num : integer

This routine is called by:
build_question_list - create the queston table
print_questionnaires - prints the questionnaire forms
print_cmd - creates the print command file

1.2.3)get_instruct_info

Description:
This routine reads in the instructor data base into a linked list from a file.

Input:
head_inst_list : a pointer to the beginning of the list.

Output:
Head_inst_list : a pointer to the head of the list

This routine is called by:
the main routine
This routine call:
get_rec

1.1.2.1) get_rec

Description:
This routine reads in an instructor record for the instructor data base file.

Input:
Instructor's name : a string of up to 14 characters
first initial : character
Department abbreviation : string of up to 5 characters
Department number : integer number (0<=n<=9999)
Course number : integer number (0<=n<=999)
Course section number : integer number (0<=n<=999)
Print flag : char
Number of questionnaires requested : integer number (0<=n<=999)
Form number : integer number (0<=n<=9999)
instructor picked questions : list of question numbers (0<=n<=23)
question numbers : integer number (0<=n<=9999)

Output:
The output is the same as the input exept the information is in a linked list

This routine is called by:
get_instruct_info

1.2.4) get_commands

Description:
This routine opens the print commands file.

Input:
none

Output:
none

This routine is called by:
the main routine

1.2.5) Print_info

Description:
The instructor data base is checked to see what needs to be printed. A key will be unset if the file has not been printed. General information about the instructor is placed into a file. The appropriate number of blank lines are then printed to skip over the global questions that are preprinted at the top of the form. The questions that the instructor picked are then used to into the question data base to obtain the questions to be printed. The questions are printed into the same file as the instructor's information. Once the form is created, a key is set in the instructor's information record signifying that the instructor's form has been printed.

Input:
Data base of instructor information
The table of questions

Output:
Files containing the instructor's questionnaire form

This routine is called by:
the main routine
This routine calls:
get_out_file - Opens the questionnaire output file
print_heading - Prints the questionnaire heading
print_quest - Prints the questions for the form
print_cmd - Prints the print command file

1.2.5.1) get_out_file

Description:
This routine opens the output files for the questionnaire forms. The routine keeps track of the questionnaire file number by using a batch file which contains the number of the file. The routine updates the batch file number each time it is called.

Input:
none

Output:
opens a text file

This routine is called by:
print_info - prints the questionnaire forms
The routine calls:
init_out_string - initialize file name

1.2.5.1.1) init_out_string

Description:
This routine initializes the string that will be the file name.

Input:
none

Output:
out_string : packed array [1..14] of char;

This routine is called by:
get_out_string - opens the output file

1.2.5.2) print_heading

Description:
This routine writes the instructor's name, department abbreviation, department number, course number, and section number onto the to of the questionnaire form. The routine the writes the blank lines needed to start the questions in the right spot.

Input:
an instructor record

Output:
Heading for the file

This routine is called by:
print_info - print questionnire form

1.2.5.3) print_quest

Description:
This routine uses the question numbers in the instructor record to obtain the questions from the question table. The routine uses the question numbers as an index to read the questions out of the table. If the question is not in the found in the table then a blank line is printed. The routine will stop when it reaches 23 questions or until a question number zero is found in the instructor record.

Input:

A pointer to the instructor record
The question table

Output:
The questions for the questionnaire

This routine is called by:
print_info - prints a questionnaie form
This routine calls:
get_num - Convert an array of digits to an integer number

1.2.5.5) print_cmd

Description:
This routine will create a command file of print requests. For each instructor's questionnaire form a print command will be given. The print command will give the name of the instructor's file to be printed, the number of copies to print, the type of forms to use and any other appropriate specifications. The number of forms to be printed will be obtained from the instructor's information. If more than 300 forms are to be printed the routine will write multiple print requests.

Input:
A questionnaire form number from a file
A list of instructor requests that need to be printed

Output:
A command file of print requests

This routine is called by:
print_info - prints the questionaire forms
This routine calls:
get_num - convert an array of digits to a integer number
print_line - prints a command line

1.2.5.5.1) print_line

Description:
This routine writes out the command line to print the questionnaire form with the appropriate switches.

Input:
output file name
number of copies to print

Output
A command string to print the form

This routine is called by:
print_cmd - prints the command lines

1.1.6) dump_inst

Description:
This routine writes the updated instructor records to a file.

Input:
head_inst: a pointer to the beginning of the instructor list.

Output:
A file containing the instructor records

The routine is called by:
the main routi

Design document for the report generation routines for the Faculty Evaluation System

2) Generating evaluation report

Description:
The report generation routines are composed of two parts. The first part computes the statistics files from the questionnaire answers. The second part of the routine will generate the reports for the instructor and for the faculty evaluation committee.

Input:
questionnaire answers from a scantron card reader

Output:
report for the instructor
report for the faculty evaluation committee

The following routines are used by the system:

- stats - Computes the statistics from the questionnaire answers
- report - Produces the reports for the instructor and the faculty evaluation committee

2.1) stats

Description:
The statistics routine reads in files that were generated by the scantron card reader. The routine converts the scantron codes into numbers. The routine then computes the following statistics from the questionnaire answers: the frequency, the mean, and the standard deviation. The first card that the routine reads contains the depratment number, course number, and section number for the questionnaire answers. The header record will be used in the report program to find the correct instructor record. Each set of questionnaire statistics is placed into a seperate file that will be accessed to create the report. If the scantron file is empty an error message is printed an no file is generated.

Input:
header record
raw scantron data

Output:
Statistics files

The following subroutines are called by this routine:

- get_files - get a scantron produced file

get_info - read in scantron information
compute_stats - computes the statistics on the information
print_results - prints the statistics information into a file

2.1.1) get_files

Description:
This routine will open a scantron generated file if it exists. If the file is not there then an error messages is returned. The routine will check for scantron file 0-9. If the file exists then the result file is opened.

Input:
scantron file number

Output:
error flag
the opened scantron file
the opened statistics file

This routine is called by:
the main routine
The routine calls:
get_out_file - open the output file

2.1.1.1) get_out_file

Description:
This routine will create the output files for the statistics. It will also increment the batch number in the batch file so that each call to this routine will increment the number so the output files will all be named differently.

Input:
none

Output:
the opened output file

This routine is called by:
get_files
The routine calls:
init_out_string

2.1.1.1.1) init_out_string

Description:
This routine initializes the string that will contain the

output file name.

Input:
none

Output:
out_string : packed array [1..14] of char

This routine is called by;
get_out_file

2.1.2) get_info

Description:
This routine will read in all of the information that is in the scantron questionnaire answer file. Each answer record is the answers for one person's evaluation of the instructor. The records are put into a linked list so the statistics can be computed. The routine will write an error message if there is no data in the file.

Input:
Raw scantron data for an instructor

Output:
A linked list of answers and a header record with the department number, course number, and section number.

This routine is called by:
the main routine
The routine calls:
init_head_conv_table - intialize the header conversion table
get_header - read in and convert the header record
init_array - initialize the array to hold the answers
get_card - read in a answer record

2.1.2.1) init_head_conv_table

Description:
This routine sets up a table that contains all of the possible values for a header card record.

Input:
none

Output:
head_conv_table

This routine is called by:
get_info - reads in a scantron file

2.1.2.2) get_header

Description:
This routine uses the header convertion table to convert the scantron code to a the numbers representing the department, course, and section numbers.

Input:
scantron header record

Output:
header : packed array [1..11] of char;

This routine is called by:
get_info - reads in a scantron file

2.1.2.3) init_array

Description:
This routine initializes the array that will contain a questionnaire answer record. That is the answers to one questionnaire form.

Input:
none

Output:
l_array : array [1..33] of integer;

This routine is called by:
get_info - reads in a scantron file

2.1.2.4) get_card

Description:
This routine converts the scantron code for a questionnaire answer into integer numbers.

Input:
A scantron answer record

Output:
The integer numbers for the answers

This routine is called by:
get_info - reads in a scantron file

2.1.3) compute_stats

Description:

This routine computes the frequency, mean, and standard deviation for each of the questions. All zero values in the records are discarded.

Input:
The list of all question answers

Output:
The frequency, mean, and standard deviation of the questions

This routine is called by:
the main routine
The routine calls:
init_results - initialize the results to zero

2.1.3.1) init_results

Description:
This routine initializes the statistics variables to start at zero.

Input:
none

Output:
tot_ans_line : array [1..33] of real;
mean : array [1..33] of real;
stand_dev : array [1..33] of real;
frequency : array [1..33,1..5] of real;

This routine is called by:
compute_stats : computes the questionnaire answers statistics

2.1.4) print_results

Description:
The routine will print the statistics information to the appropriate file. The output file name will be changed by the time this routine is executed again.

Input:
tot_ans_line : array [1..33] of real;
mean : array [1..33] of real;
stand_dev : array [1..33] of real;
frequency : array [1..33,1..5] of real;

Output:
The above input information is written to a file

This routine is called by:

the main routine

2.2) report

Description:
This routine will produce the reports for the answers given by the students to the evalutaion questions. The report for the instructor consists of questions that the instructor picked and the results to the questions. The routine also produces a report for the faculty evaluation committee. This report lists the global qustions and the results for the questions. The routine allows the user to create multiple reports or to create a single report.

Input:
The instuctor data base
The question data base
The statistics files for the instructors

Output:
The instructor's personal report
The faculty evaluation report

This routine calls the following subroutines:
get_instruct_info - read in the instructor data base
build_question_list - create the question table
single_entry - create a single report
mult_entry - create multiple reports

2.2.1) get_instruct_info

Description:
This routine builds a tree containing the instructor information. The tree contains three branches. In the top branch of the tree is a linked list of departments. On each of the nodes in the department linked list is a pointer to a list of all of the courses in the department. On each of the nodes for a course is a pointer to a list of sections that belong to a course. The tree structure allows for rapid lookup of instructor records as well as finding errors if the information is not in the tree.

Input:
head_inst_list : a pointer to the beginning of the list.

Output:
Head_inst_list : a pointer to the head of the list
the tree containing the instructor records

This routine is called by:
the main routine
This routine call:

get_rec - get an instructor record

2.2.1.1) get_rec

Description:
This routine reads in an instructor record for the instructor data base file.

Input:
Instructor's name : a string of up to 14 characters
first initial : character
Department abbreviation : string of up to 5 characters
Department number : integer number (0<=n<=9999)
Course number : integer number (0<=n<=999)
Course section number : integer number (0<=n<=999)
Print flag : char
Number of questionnaires requested : integer number (0<=n<=999)
Form number : integer number (0<=n<=9999)
instructor picked questions : list of question numbers (0<=n<=23)
question numbers : integer number (0<=n<=9999)

Output:
The output is the same as the input exept the information is in a linked list

This routine is called by:
get_instruct_info

2.2.2) build_question_list

Description:
This routine reads in the questions from the question data base. The questions are placed into the question table according to there number. All empty spots in the table will have a nil value.

Input:
A file of questions

Output:
q_tab : array [1..9999] of questions

where questions consist of the following
question number : packed array [1..4] of char;
question string 1 : packed array [1..43] of char;
question string 2 : packed array [1..43] of char;

This routine is called by:
the main routine

This routine calls:
init_table - initialize the question table to all nils
get_quest - reads in a question
get_num - converts an array to an integer

2.2.2.1) init_table

Description:
This routine initializes the question table file to be an array of pointers all equal to nil.

Input:
none

Output:
q_tab : array [1.9999] of pointers

This routine is called by:
build_question_list - creates the question table

2.2.2.2) get_quest

Description:
This routine reads in a question from the quesion data base file.

Input:
A question record

Output:
A pointer to the question record

This routine is called by:
build_question_list - builds the question table

2.2.2.3) get_num

Description:
This routine receives an array of digits and converts them into an integer number:

Input:
key : packed array [1..4] of char;

Output:
num : integer

This routine is called by:
build_question_list - create the queston table
print_instructor - print the instructor information

2.2.3) Single_mode

Description:
This routine will produce a report for one instructor. The correst department, course, and section number are first found and then a check to see if the instructor taught the class is made. This routine is used mainly for the case where more than one teacher taught a class and the instructor's name has to be entered to make the record unique. This routine will write all error messages to the terminal.

Input:
The statistics file number
The instructor's name

Output:
A report for the instructor
A report for the faculty evaluation committee

This routine is called by:
the main routine
The routine calls:
get_number - reads in an integer number
get_file - get the appropriate output file
get_header - read in the header record
find_rec - find the instructor record in the dat base
print_report - print the reports

2.2.3.1) get_numbers

Description:
This routine reads in an integer number from the terminal. The number is read in a character at a time and the number is computed. The routine will only exept valid integer numbers. An error message will be printed for invalid entries and the user will have to enter a new number.

Input:
characters from the terminal

Output :
An integer number

This routine is called by
single_entry - create a single report
mult_entry - create multiple reports

2.2.3.2)get_file

Description:
This routine will get an input statistics file. The number

that is passed to it is the number of the file that is to be opened.

Input:
file_number : integer

Output:
An opened statistics file

This routine is called by:
single_entry - create a single report
mult_entry - create multiple reports

2.2.3.3) get_header

Description:
This routine will read in the header card from the statistics file. It fills in the extra characters needed to match the fields in the instructor record.

Input:
Header record

Output:
The department, course and section number

This routine is called by:
single_entry - create a single report
mult_entry - create multiple reports

2.2.3.4) find_rec

Description:
This routine will find an instructor's record in the list of instructor records. If the record is not found then an error message is printed to the error fileand a nil values is returned as a pointer. If the record is fund then a pointer to the record is returned.

Input:
The header record (dept,course,sect. numbers)

Output:
A pointer to the instructor record

This routine is called by:
single_entry - create a single report
mult_entry - create multiple reports

2.2.3.5) print_report

Description:
This routine calls the appropriate subroutines to print out the reports for the instructor's report and for the faculty evaluation report.

Input:
A pointer to the instructor record
The opened statistics file
The file number (for an output file number)

Output:
The instructor's report
The faculty evaluation committee's report

This routine is called by:
single_entry - create a single report
mult_entry - create multiple reports
The routine calls:
get_out_file - opens the output file
get_global_stats - gets the global question results
line - draws a line
print_global - prints the global questions
print_inst - prints the instructor's picked questions

2.2.3.5.1) get_out_file

Description:
This routine will open the output file. The file number that is passed to it is the same as the number of the statistics file that the report is for.

Input:
file_number : integer

Output:
the opened output file

This routine is called by:
print_report - prints the reports

2.2.3.5.2) get_global_stats

Desription:
This routine will read in the statistics for the global questions from the statistics file.

Input:
frequency, mean, and standard deviation for the global questions

Output:

```
globals : array [1..10] of stats type;
```

This routine is called by:
print_report - prints the reports

2.2.3.5.3) line

Description:
This routine will write a line with the given charater for the length passed to it.

Input:
ch : char
num : integer

Output:
A line of length num using character ch

This routine is called by:
print_report - prints the reports
print_quest - prints the instructor's questions
print_student - prints the global questions

2.2.3.5.4) print_global

Description:
This routine calls the routines to print out the report for the global question.

Input:
A pointer to the instructor record
the global statistics record
the opened output file

Output:
The global questions report

This routine is called by:
print_report - prints the reports
The routine calls:
print_student - prints students general information
print_eval - print the evaluation questions

2.2.3.5.4.1) print_student

Description:
This routine will print the global questions on the students. A pointer to the instructor's information is passed to print out the heading. The routine prints out the first seven questions in the questionnaire form. These questions are general questions about the students taking the class.

Input:
A pointer to the instructor record
the global statistics record
the opened output file

Output:
The first seven questions of the report

This routine is called by:
print_global - prints the global questions
The routine calls:
line - writes a line with the given character

2.2.3.5.4.2) print_eval

Description:
This routine will create the questions reports for the evaluation questions in the global questions. The routine calls a routine to print the questions. The question is changed each time the routine is called.

Input:
the global statistics record
the opened output file

Output:
the evaluation questions of the report (8-10)

This routine is called by:
print_global - prints the global questions report
The routine calls:
print_quest - prints a question

2.2.3.5.4.2.1) print_quest

Description:
This routine will print the standard evaluation questions and the instructor picked questions. The question to be printed is passed as a parameter along with the number of the question to be printed and the statistics for the question. The routine displays a different heading for the standard evaluation questions and the instructor picked questions

Input:
quest_num : integer
quest : the question to be printed
response : type of response for a heading
q_stats : the statistics for the question
outfile : the opened output file

Output:
the question is written to the output file with the above information.

This routine is called by:
print_eval - print evaluation questions
print_instructor - prints the instructor picked questions
The routine calls:
print_mean - prints the mean for the question
print_con - prints the consensus for the question

2.2.3.5.4.2.1.1) print_mean

Description:
This routine will write an interpretation of the value for the mean.

Input:
mean : real

Output:
A written form of the mean

This routine is called by:
print_quest - prints and instructor question

2.2.3.5.4.2.1.2) print_con

Description:
This routine will write an interpretation of the value for the standard deviation.

Input:
stand : real

Output:
A written form of the standard deviation

This routine is called by:
print_quest - prints and instructor question

2.2.3.5.5) print_instructor

Description:
This routine receives a pointer to the instructor's information as input, and has the output files passed to it. This routine will go through the list of the instructor's picked questions and finds them in the question list. The procedure print_quest is then called to print out the question.

Input:
A pointer to the instructor record
the question table
the output file number
the stats and output files

Output:
the instructor's picked questions are written to the output file.

The routine is called by:
print_report - prints the reports
The routine calls:
get_num - converts an array to an integer number
print_ques - prints a question

2.2.4) Mult_entry

Description:
This routine will generate the report files for any number of files. The number of the low and high files are entered. These numbers are used to obtain the statistics files and to create the output files. All error messages are written to the file error.fil

Input:
The low statistics file number
The high statistics file number

Output:
The reports for all of the files

This routine is called by
the main routine
The routine calls:
get_number - reads in an integer number
get_file - get the appropriate output file
get_header - read in the header record
find_rec - find the instructor record in the dat base
print_report - print the reports

Design document for the third part of the faculty evaluation system.

3) quest

Description:
This routine is used to maintain the question data base and the standard forms data base. The user has the options to modify multiple questions of single questions. The user can also delete, add, and print questions. For the standard forms the user can add, delete and print the standard forms. The main rountine allows the user to enter the modification option for the file and then calls the appropriate subroutine to perform the task.

Input:
The question data base
The standard forms data base

Output:
The updated question data base
The updated standard form data base

This routine calls the following subroutines:

```
build_question_list - puts the questions into a linked
                      list
get_forms - reads in the standard forms
heading - prints the heading and menu
mult_quest - lets the user modify multiple questions
single_quest - lets the user modify a single question
delete_quest - deletes a question
add_quest - adds a question
print_quest - prints the question data base
add_stan_form - adds a standard form
delete_stan_form - deletes a standard form
print_stan_form - prints the standard forms
dump_question_list - writes the question list to an
                     output file
dump_standard_forms - writes the standard forms to an
                      output file
```

3.1) build_question_list

Description:
This routine reads in the questions from the question data base. The questions are placed into a linked list.

Input:
A file of questions

```
Output:
head : a pointer to the head of the question list

where questions consist of the following
       question number : packed array [1..4] of char;
       question string 1 : packed array [1..43] of char;
       question string 2 : packed array [1..43] of char;

This routine is called by:
       the main routine
This routine calls:
       get_quest - reads in a question
```

3.1.1) get_quest

```
Description:
This routine reads in a question from the quesion data base
file.

Input:
A question record

Output:
A pointer to the question record

This routine is called by:
       build_question_list - builds the question list
```

3.2) get_form

```
Description:
This routine reads in the standard forms into a linked list.
The standard forms are read in from a file "stan.frm".

Input:
A file of standard forms

Output:
A linked list of standard forms

where a standard form consists of:
       A form number : packed array [1..4] of char
       question_number : array [1..23] of question numbers

This routine is called by:
       the main routine
```

3.3) heading

```
Description:
This routine writes the heading message for the question
```

maintainance routine. It also displays a list of options for modifying the questions and the standard forms.

Input:
none

Output:
The program heading and menu

This routine is called by:
the main routine

3.4) mult_quest

Description:
This routine allows the user to modify the existing questions in the data base. The user will type in a replacement for the questions. The old question is overwritten.

Input:
start question number
end question number

Output:
the updated question list

This routine is called by:
the main routine
The routine calls:
convert - converts an integer to an array of characters
mod_question - lets the user modify the question

3.4.1) convert

Description:
This routine receives an integer number as input an converts it to an array [1..4] of characters.

Input:
num : integer

Ouput:
key : packed array [1..4] of char

This routine is called by:
mult_quest - lets the user modify multiple questions
single_quest - lets the user modify a single question
delete_quest - deletes a question
add_quest - adds a question
add_stan_form - adds a standard form

delete_stan_form - deletes a standard form

3.4.2) mod_question

Description:
This routine allows the user to modify a question. The routine is passed a pointer to the question that is to be modified. The routine displays the question an asks the user if it is to be modified. If the user chooses to modify the question he enters in the new question.

Input:
A pointer to the question

Output:
The updated question

This routine is called by:
mult_quest - lets the user modify multiple questions
single_quest - lets the user modify a single question
The routine calls:
get_string - reads in a question string

3.4.2.1) get_string

Description:
This routine reads in a string for the question. The maximum length of the string is set at 43 characters. The routine will ignore all input past 43 characters. The questions in the data base are composed of two strings.

Input:
text from the terminal

Output:
string : packed array [1..43] of char

This routine is called by:
mod_question - modify a question
add_quest - adds a question

3.5) single_quest

Description:
This routine allows the user to modify a single question. The user enters the question that is to be modified. The old question will be overwritten by the new question.

Input:
The head of the question list

Output:
The updated question

This routine is called by:
the main routine
The routine calls:
convert - converts an integer to an array of characters
mod_question - lets the user modify the question

3.6) delete_quest

Description:
This routine allows the user to delete a question from the data base. The user enters in the number of the question to be deleted. The routine then finds the question in the data base and calls delete to display the question.

Input:
A pointer to the beginning of the question list

Output:
The updated question list

This routine is called by:
the main routine
The routine calls:
convert - converts an integer number to an array of characters
delete - displays and deletes the question

3.6.1) delete

Description:
This routine displays the question to be deleted. The routine gives the user the option of deleting the question or returning to the main routine.

Input:
A pointer to the question to be deleted

Output:
The updated question list

This routine is called by:
delete_quest - delete a question

3.7) add_quest

Description:
This routine allows the user to add a question to the question

list. The routine adds the question number onto the end of the question list.

Input:
A pointer to the beginning of the question list

Output:
The updated question list

This routine is called by:
the main routine
The routine calls:
get_num - convert a character array to an integer
convert - converts an integer number to a character array
get_string - gets a string for the question

3.7.1) get_num

Description:
This routine receives an array of digits and converts them into an integer number:

Input:
key : packed array [1..4] of char;

Output:
num : integer

This routine is called by:

3.8) print_quest

Description:
This routine writes all of the questions in the data base to a file "quest.rpt". The routine writes headers on the top of a page an draws a line of stars between each question.

Input:
head_list : a pointer to the beginning of the question list

Output:
A file containing the questions

This routine is called by;
the main routine

3.9) add_stan_forms

Description:
This routine allows the user to add a new standard form to the

standard form data base. The routine displays the new standard form number and the prompts the user for entry of the question numbers for the form. The user may type at most 23 questions for a standard form. If the standard form is to contain less than 23 questions then the user may type a zero for the last question number and the rest of the standard form will be filled in with zeros.

Input:
The head of the standard form list
the new standard form

Output:
The updated standard form list

This routine is called by:
the main routine
The routine calls:
char_to_dig - character to digit conversion
convert - convert an integer number to an array of characters
init_quest_array - initialize the question array to all zeros

3.9.1) char_to_dig

Description:
This routine receives an array of characters and converts it into an integer number.

Input:
key : packed array [1..4] of char

Output:
num : integer

This routine is called by:
add_stan_form - adds a standard form

3.9.2) init_quest_array

Description:
This routine initializes the array of standard form numbers to be all zeros.

Input:
A pointer to the standard form

Output:
The updated standard form

This routine is called by:
add_stan_form - adds a standard form

3.10) delete_stan_form

Description:
This routine allows the user to delete a standard form. The routine is passed a pointer to the beginning of the standard form list. The user then enters the standard form to be deleted. The user has the option of deleting the standard form or returning to the main routine.

Input:
A pointer to the beginning of the standard form list

Output:
The updated stnadard form list

This routine is called by:
the main routine
The routine calls:
convert - converts and integer number to an array of characters
d_form - displays and deletes a standard form

3.10.1) d_form

Description:
This routine will display the question numbers in the standard form to be deleted. The user then has the option of deleting the form or returning to the man routine.

Input:
A pointer to the standard form to be deleted

Output:
The updated standard form list

This routine is called by:
delete_stan_form - delete a standard form

3.11) print_stan_form

Description:
This routine uses the question numbers in the standard forms to locate the questions in the question list. The routine then prints the questions that are in the standard forms.

Input:
A pointer to the beginning of the standard form list

Output:
A text file containing all of the standard forms

This routine is called by:
the main routine
The routine calls:
line - draws a line of characters

3.11.1) line

Description:
This routine draws a line of charcters for the length of the number passed to it with the letter passed to it.

Input:
ch : char
num : integer

Output:
A line drawn with character ch of length num

This routine is called by;
print_stan_forms - print the standard forms

3.12) dump_question_list

Description:
This routine writes the updated version of the question list to a file. The file that it is written to will overwrite the file that the questions were originally read in from.

Input:
A pointer to the beginning of the question list

Output:
A text file containing the questions

This routine is called by:
the main routine

3.12) dump_standard_forms

Description:
This routine writes the updated version of the standard forms to a file. The file that it is written to will overwrite the file that the standard forms were originally read in from.

Input:
A pointer to the beginning of the standard form list

Output:

A text file containing the standard forms

This routine is called by:
the main routine

This routine is an addition to the original design of the faculty evaluation system.

4) edstat

Description:
This routine allows the user to edit the header card on the statistics file. The statistics files had a large number of errors in the header record this routine was written so the user did not have to enter in the information again.

Input:
A statistics file

Output:
The updated statistics file

The routine calls the following subroutines:
- get_num - reads in an integer number
- get_file - opens a statistics file
- read_stats - reads in the statistics file
- edit_stats - allows the user to alter the header record
- write_stats - writes out the updated statistics file

4.1) get_num

Description:
This routine reads in an integer number from the terminal. If an invalid character is enetered the user has to reenter the number.

Input:
Text from the terminal

Ouput:
An integer number

This routine is called by;
- the main routine
- edit_stats - allows the user to alter the header record

4.2) get_file

Description:
This routine will open a statistics file. The number that is passed to it is the number of the statistics file to be opened.

Input:
num : integer

Output:
The opened statistics file

This routine is called by:
the main routine

4.3) read_stats

Description:
This routine will read in the information from the statistics file. The header record is read into a record. The rest of the file is then read into a linked list.

Input:
A statistis file

Output:
The header record
The statistics information

This routine is called by:
the main routine

4.4) edit_stats

Description:
This routine displays the header record an asks the user if it is to be changed. The user has the option of changing the header record or returning to the main routine. The header record is displayed again after the change has been made.

Input:
The header record

Output:
The updated header record

This routine is called by:
the main routine
This routine calls:
get_num - read in an integer number
convert3 - convert an integer number into an array of characters

4.4.1) convert3

Description:
This routine converts the integer number passed to it into an

array [1..3] of characters.

Input:
num : integer

Output:
letters : packed array [1..3] of char;

This routine is called by:
edit_stats - alters the header record for a statistics file

4.5) write_stats

Description:
This routine writes the updated information back to the original statistics file. The old statistics file is deleted in the process.

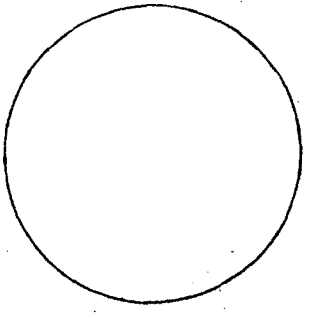
Input:
header - statistics header record
head_stats - a pointer to the statistics

Output:
The updated statistics file

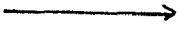
This routine is called by:
the main routine

Program Flow Diagrams

Notation

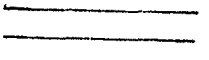


a process



a Data Flow

a File

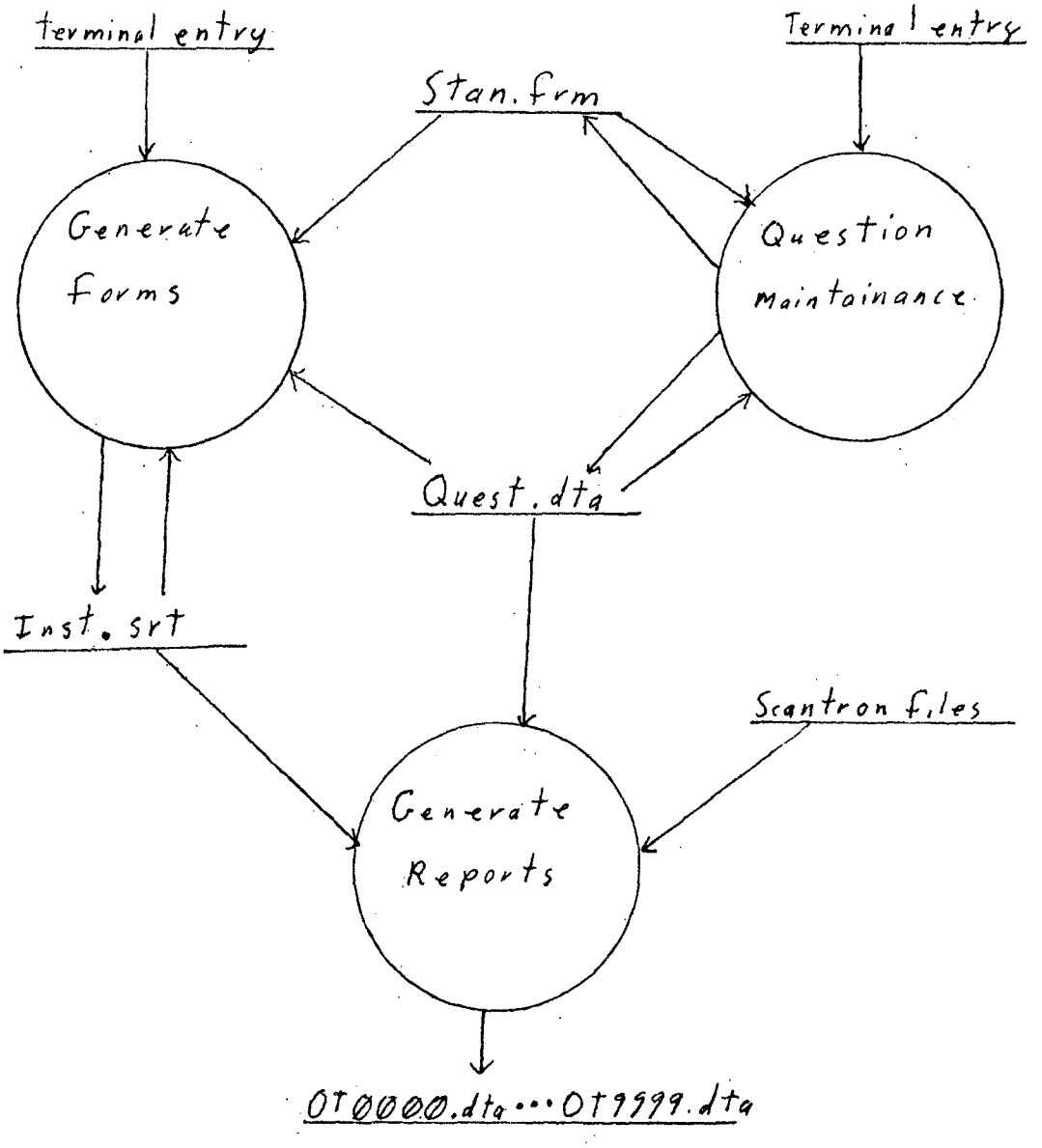


a Local File

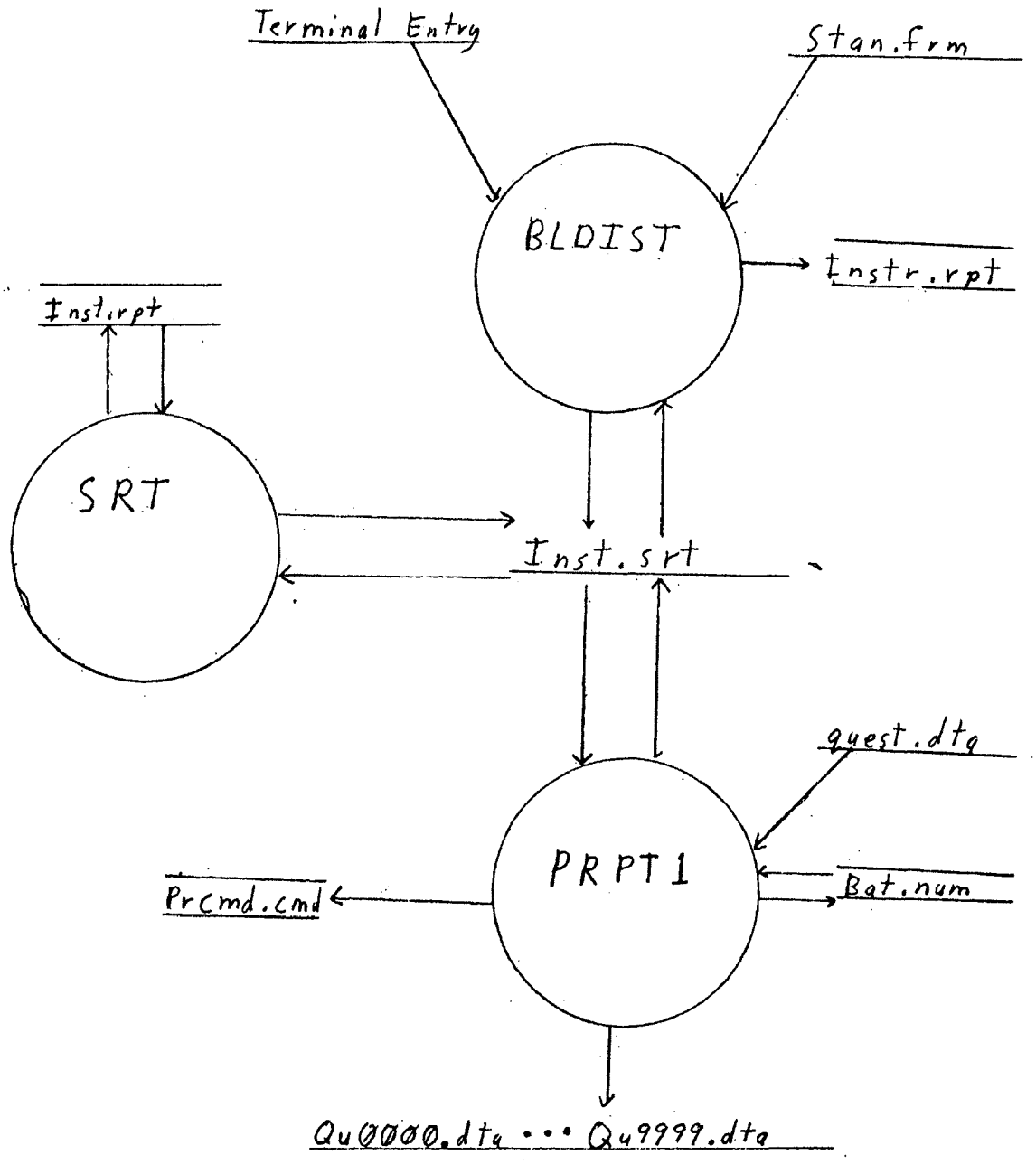
PROG

a Program

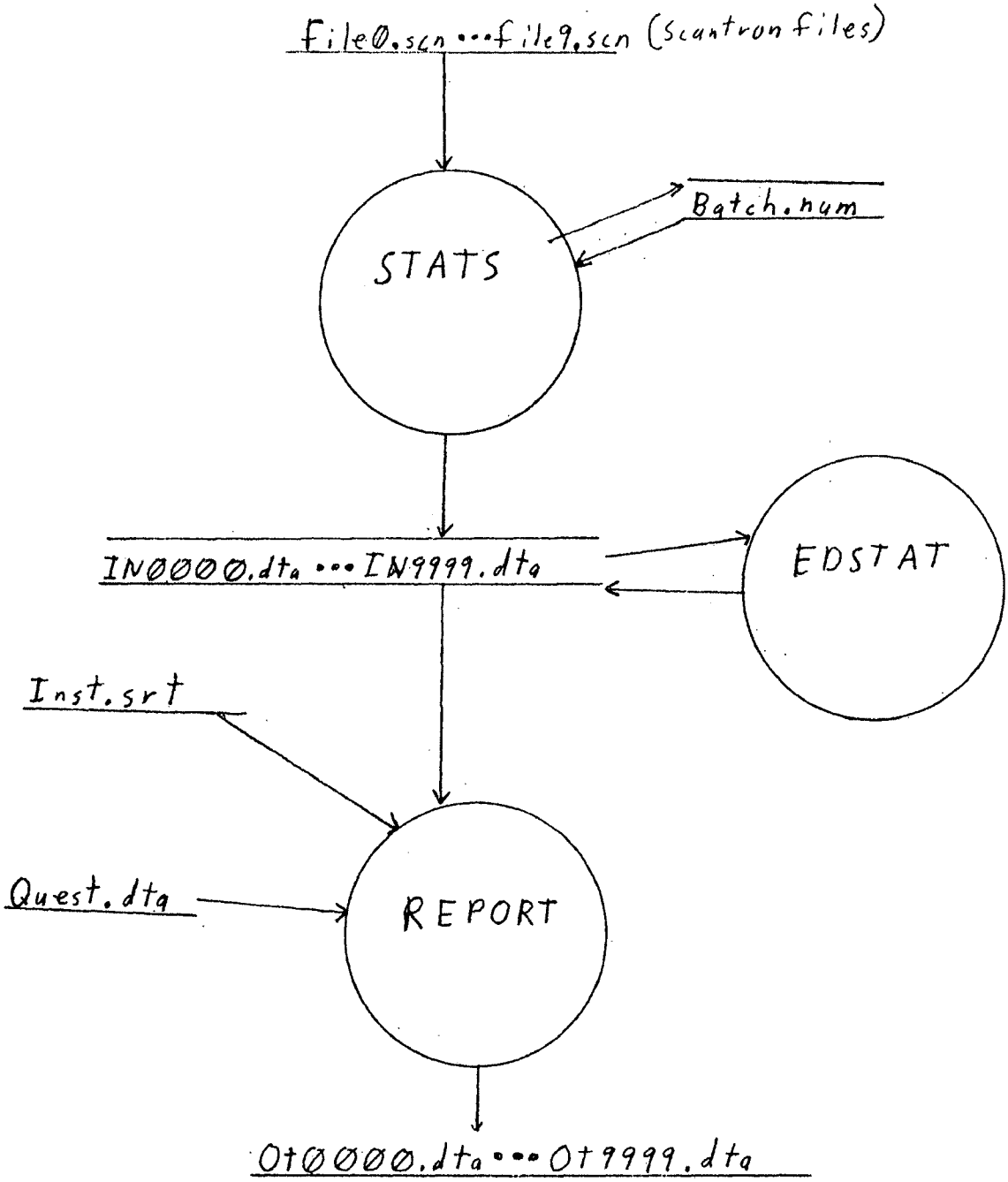
Evaluation System



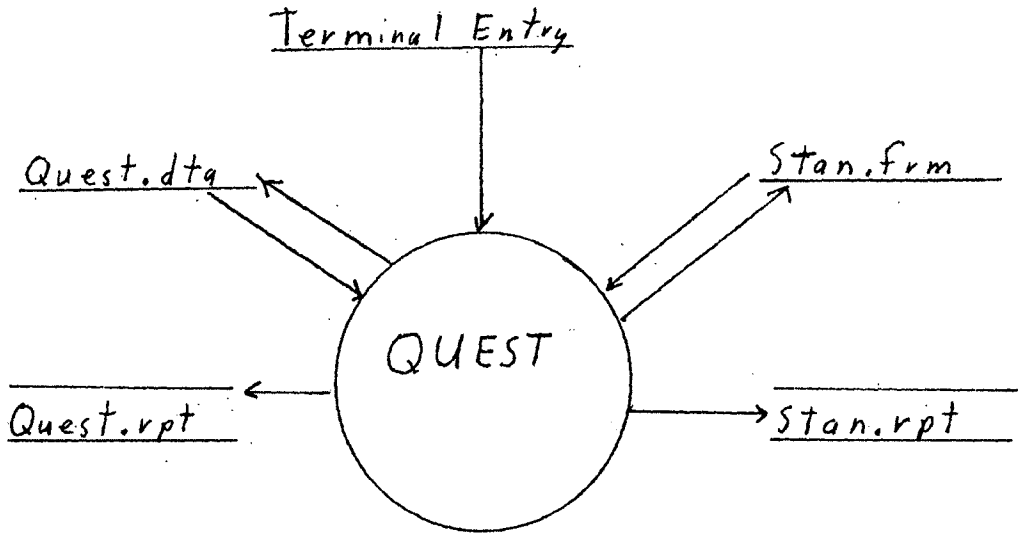
Generate Forms



Generate Reports



Question Maintainance



APPENDIX E

PROGRAMS

```
;The login command file sets up all of the logical names that
;will be needed in the programs for the faculty evaluation system.
;The command file also connects the user to psl: where all of
;the programs and data areas are located.
;
def sys:psl:<faculty-evaluation>,psl:<faculty-evaluation.source>,sys:
def man: psl:<faculty-evaluation.manuals>
def fac: psl:<faculty-evaluation>
def src: psl:<faculty-evaluation.source>
def sts: psl:<faculty-evaluation.stats>
def rpt: psl:<faculty-evaluation.report>
def cs: ps:<cs.grad.weiler>
ter no ra
ter no pau en
cookie
access psl:<faculty-evaluation>
i mail
connect psl:<faculty-evaluation>
```

```
;This commands file runs the program to enter instructor
;information into a the instructor data base.  After the
;program has been exitted the routine submits a batch job
;to sort the instructor records according to the department,
;course, and section number.
;
run bldist
submit srt.ctl
```

```
;This routine will print out all of the evaluation reports
;that are currently in the report area.  The routine submits
;the reports for printing with all of the appropriate switches.
;
print /note:"hold&B&c"/delete/forms:bk9713 rpt:ot*.*
print /note:"hold" psl:<faculty_evaluation.report>error.fil
```

```
  program build_instructor_database;
  {
   BLDIST.PAS  -  Maintain instructor data base

   Written by: Peter Weiler
   Final modification date: May 20, 1983

   This program is used to maintain the instructor data base.
   The program will display a menu of options for modifying the
   instructor data base.  The program will then call the appropriate
   procedure to perform the task.  This routine allows the user to
   add,delete, and print records in the instructor data base.  The
   routine will also automatically back up the instructor data base
   after every ten changes have been made to it.

   The information for the instructor data base is stored in the file
   'INST.SRT' this file should be sorted when the program reads it in.
   All new instructor records are added to the bottom of the file.
   The file will be resorted after this program is exited.
   The input data file is in the following format:

   dept_code : field (1 - 4)
   course_num : field (5 - 7)
   sect_num : field (8 - 11)
   inst_init : field (12)
   inst_name : field (13 - 26)
   dept_abr : field (27 - 31)
   print_flag : field (32 - 36)
   num_of_quest : field (37 - 39)
   quest_nums : field (40 - 131)

   The instructor maintainance program also uses a file that contains
   the standard forms.  This file is called 'STAN.FRM'.  The format
   for the file is as follows:

   form number : fields(1 - 4)
   quest numbers : fields(5 - 96)

   where the question number field contains 23 question numbers with
   each question number taking up four characters.

   }
const
  key_length = 4;
  num_length = 3;
  max_quest_nums = 23;
  name_length = 14;
  d_abr_length = 5;

type
```

```
  key_type = packed array [1..key_length] of char;

  num_type = packed array [1..num_length] of char;

  quest_list = array [1..max_quest_nums] of key_type;

  form_ptr = ^form_type;

  form_type = record
                form_num : key_type;
                quest_nums : quest_list;
                next : form_ptr
              end;

  name_type = packed array [1..name_length] of char;

  d_abr_type = packed array [1..d_abr_length] of char;

  inst_list = ^inst_rec;

  (* The instructor record is read in from the file inst.srt *)
  inst_rec = record
               dept_code : packed array [1..4] of char;
               course_num : num_type;
               sect_num : num_type;
               inst_init : char;
               inst_name : name_type;
               dept_abr : d_abr_type;
               print_flag : char;
               num_of_quest : num_type;
               quest_nums : quest_list;
               next : inst_list
             end;

var
  form_file,in_inst,out_inst : text;
  head_form : form_ptr;
  head_inst : inst_list;
  option : char;
  eof_flag : boolean;
  changes : integer;

  procedure line (length : integer; ch : char; var outfile : text);

    (* The procedure will write a line for the given character ,ch,
     and length ,length, for file ,outfile *)

  var
    i : integer;

  begin
```

```
   for i := 1 to length do
   write (outfile,ch)
  end; (* line *)

procedure get_forms (var stan_forms : form_ptr);

   { This routine reads in the standard questionnaire records
    into a linked list.  Each standard questionnaire consists of
    a form number and 23 question numbers }

var
   i : integer;
   temp_f_ptr : form_ptr;

 begin { get_forms }
  reset (form_file,'stan.frm');
  new (stan_forms); { set head of form list }
  temp_f_ptr := stan_forms;
  temp_f_ptr^.form_num := '0000';
  temp_f_ptr^.next := nil;
  while not eof (form_file) do
   begin   { read in a standard form }
    read (form_file,temp_f_ptr^.form_num);
    for i := 1 to max_quest_nums do
    read (form_file,temp_f_ptr^.quest_nums[i]);
    readln (form_file);
    if not eof (form_file)
    then
     begin
      new (temp_f_ptr^.next);
      temp_f_ptr := temp_f_ptr^.next
     end
    else
    temp_f_ptr^.next := nil  { set end of list }
   end
 end; { get_forms }


procedure convert4 (num : integer; var key : key_type);

  {  This routine converts an integer number ,num, to an
   array of characters ,key,  The array has a range of [1..4].
   }

var
  i : integer;

 begin  { convert 4 }
  for i := key_length downto 1 do
   begin
    key[i] := chr((num mod 10) + ord('0'));
```

```
    num := num div 10
   end
 end; (* convert4 *)

procedure convert3 (num : integer; var letters : num_type);

  { This routine converts an integer number ,num, to an
   array of characters, letters.  The array has a range of [1..3].
   }

var
  i : integer;

 begin { convert3 }
  for i := num_length downto 1 do
   begin
    letters[i] := chr((num mod 10) + ord('0'));
    num := num div 10
   end
 end; (* convert3 *)

procedure get_name (var name : name_type);

  { This routine reads in the instructor's name and puts it
   into an array [1..14] the routine will fill in the right
   side of the array with blanks.  The routine also converts
   all lower case characters to upper case characters.
   }

var
  ch : char;
  count : integer;

 begin { get_name }
  name := '              ';
  count := 1;
  ch := input^;
  get (input);
  if not eoln
  then
  name[1] := ch;
  while not eoln and (count < name_length) do
   begin
    count := count + 1;
    ch := input^;
    if (ch >= 'a') and (ch <= 'z')
    then
    ch := chr(ord(ch) - ord('a') + ord('A'));
    name[count] := ch;
    get (input)
   end;
```

```
   readln
  end; { get_name }

 procedure get_dept_abr (var dept_abr : d_abr_type);

   { This routine will read in the department name into an
    array [1..5]. The routine will fill in the right side of the
    department abbreviation with blanks. The routine also
    converts lower case charaters to uppper case.
    }

 var
   ch : char;
   count : integer;

  begin { get_dept_abr }
   dept_abr := '     ';
   count := 1;
   ch := input^;
   get (input);
   if not eoln
   then
   dept_abr[1] := ch;
   while not eoln and (count < d_abr_length) do
    begin
     count := count + 1;
     ch := input^;
     if (ch >= 'a') and (ch <= 'z')
     then
     ch := chr(ord(ch) - ord('a') + ord('A'));
     dept_abr[count] := ch;
     get (input)
    end;
   readln
  end; { get_dept_abr }

 procedure get_rec (var rec : inst_list;var ins : text);

   (* This procedure will read in the information on
    one instructor. *)

 var
   i : integer;

  begin (* get_rec *)
   new (rec);
   with rec^ do
    begin
     read (ins,dept_code,course_num,sect_num);
     read (ins,inst_init,inst_name,dept_abr);
     read (ins,print_flag,num_of_quest);
```

```
     for i := 1 to max_quest_nums do
     (* get instructor picked questions *)
     read (ins,quest_nums[i]);
     readln (ins);
     next := nil
    end
  end;  (* get_rec *)

 procedure get_instruct_info(var head_inst_list : inst_list);

   (* This procedure builds the linked list of instructor
    information.  The input file 'INST.SRT' should be a file that
    has been sorted according to the department, course, and
    section number.
    *)

 var
   temp,rec : inst_list;

  begin (* get_instruct_info *)
   (* sorted instructor information file *)
   reset (in_inst,'inst.srt');
   if not eof (in_inst)
   then
    begin
     get_rec (head_inst_list,in_inst);
     temp := head_inst_list;
     (* get all instructor information *)
     while not eof (in_inst) do
      begin
       get_rec (rec,in_inst);
       temp^.next := rec;
       temp := temp^.next
      end;
     eof_flag := false
    end
   else
   eof_flag := true  { instructor file is empty }
  end; (* get_instruct_info *)

procedure get_num (var num : integer);

   { This procedure reads in a string of digits from the
    terminal and converts them to an integer number.  The routine
    checks to see if the input is only the characters 0..9  if
    the user types in a different character the routine will
    print an error message and have the user reenter the
    information.
    }

var
```

```
    correct : boolean;
    ch : char;

  begin { get_num }
    repeat { until correct }
     correct := true;
     num := 0;
      repeat { until wrong or eoln }
       ch := input^;
       get (input);
       if (ch >= '0') and (ch <= '9')
       then
       num := num * 10 + (ord(ch) - ord('0'))
       else
        begin
         correct := false;
         readln;
         write ('invalid number reenter: ')
        end
      until (eoln or not correct);
     if correct
     then
     readln
    until correct
  end; { get_num }

procedure get_picked_quests (var quests : quest_list);

   {  This procedure will read in the instructor's picked questions.
    The numbers for the questions are entered from the terminal.
    The routine allows for a maximum of 23 characters to be entered.
    If the user has fewer questions to enter he types a zero for the
    last question and the routine will exit.
    }

var
   temp_f_ptr : form_ptr;
   i, quest_num, form_num, num_of_quest : integer;
   answer : char;

   procedure init_quest_array (var quests : quest_list);

     {  This procedure initializes the list of instructor picked
      questions to be all zeros.
      }

   var
     i : integer;

    begin { init_quest_array }
     for i := 1 to max_quest_nums do
```

```
      quests[i] := '0000'
     end; { init_quest_array}

    procedure char_to_dig (var num : integer; var key : key_type);

      {  This procedure will convert an array [1..4] of digits to
       a integer number. }

    var
      i : integer;

     begin { char_to_dig }
      num := 0;
      for i := 1 to key_length do
      num := num * 10 + (ord(key[i]) - ord('0'))
     end; {char_to_dig }

  begin { add_stan_forms }
   writeln;
   writeln ('Enter the question numbers for the instructor');
   writeln ('If you have fewer than 23 questions type a ,0,');
   writeln ('as the final question number to stop.');
   writeln;
   num_of_quest := 1;
   quest_num := 1;
   init_quest_array (quests);

   { exit the while loop if a question number is zero or
    if the number of questions is greater than 23 }

   while (quest_num <> 0) and
   (num_of_quest <= max_quest_nums) do
    begin
     write ('Enter the number of question',num_of_quest:3,' :');
     get_num (quest_num);
     convert4 (quest_num,quests[num_of_quest]);
     writeln;
     num_of_quest := num_of_quest + 1
    end;
  end; { add_stan_forms }

 procedure forms_quest (var quests : quest_list;form : integer);

   {  This procedure receives a form number an looks through the
    list of forms until it finds the form number.  The routine
    then writes the question numbers from the standard form into
    the question list in the instructor record.
    }

 var
   temp_form : form_ptr;
```

```
    i : integer;
    form_num : key_type;

   begin { forms_quest }
    temp_form := head_form;
    convert4 (form,form_num);

    { find the correct form number }

    while (temp_form^.form_num <> form_num) and
    (temp_form^.next <> nil) do
    temp_form := temp_form^.next;
    if (temp_form^.form_num <> form_num)
    then
    writeln ('Form number not found')
    else
    for i := 1 to max_quest_num do
    quests[i] := temp_form^.quest_nums[i]
   end; { forms_quest }

 procedure add_inst (var head_inst : inst_list);

    {  This procedure will read in the information about the
     instructor and read in either the form or question numbers
     that he selected.  It will also allow the information to be
     reviewed before accepting it.  This routine calls the
     appropriate subroutine to read in each of the fields in the
     instructor record so that all input is parsed.
     }

 var
    temp_i_ptr : inst_list;
    num : integer;
    answer : char;

  begin { add_inst }
    writeln;
    writeln ('Enter the instructor information.');
    writeln;
    if not eof_flag
    then
     begin
      temp_i_ptr := head_inst;

      { find last place }
      while (temp_i_ptr^.next <> nil) do
      temp_i_ptr := temp_i_ptr^.next;
      new (temp_i_ptr^.next);
      temp_i_ptr := temp_i_ptr^.next
     end
    else
```

```
    begin { file is empty }
     eof_flag := false;
     new (temp_i_ptr);
     head_inst := temp_i_ptr
    end;
   temp_i_ptr^.next := nil;

    repeat { until correct }
     { get information }
     temp_i_ptr^.print_flag := '0';
     write ('Enter the instructor''s name: ');
     get_name (temp_i_ptr^.inst_name);
     write ('Enter instructor''s initial: ');
     readln (temp_i_ptr^.inst_init);
     write ('Enter the dept. abr.: ');
     get_dept_abr (temp_i_ptr^.dept_abr);
     write ('Enter the dept. no.: ');
     get_num (num);
     convert4 (num,temp_i_ptr^.dept_code);
     write ('Enter the course number: ');
     get_num (num);
     convert3 (num,temp_i_ptr^.course_num);
     write ('Enter the section number: ');
     get_num (num);
     convert3 (num,temp_i_ptr^.sect_num);
     write ('Enter number of forms: ');
     get_num (num);
     convert3 (num,temp_i_ptr^.num_of_quest);
     writeln;
     write ('Is information correct? (Y or N) ');
     readln (answer)
    until (answer = 'y') or (answer = 'Y');

    repeat { until questions correct }
     writeln;
     write ('Enter form number, (0 if picked questions): ');
     get_num (num);
     if (num = 0)
     then
     get_picked_quest (temp_i_ptr^.quest_nums)
     else
     forms_quest (temp_i_ptr^.quest_nums,num);
     writeln;
     write ('Is information correct? (Y or N) ');
     readln (answer)
    until (answer = 'y') or (answer = 'Y')
  end; { add_inst }

 procedure delete_inst (var head_inst : inst_list);

   { This procedure allows the user to delete an instructor
```

```
    record.  The routine has the user enter the instructor's
    name and the course that he is teaching.  The procedure will
    then display all records that have the information in them.
    The procedure will allow the user to view duplicate records
    in this manner.
    }

var
  temp_i_ptr : inst_list;
  c_num : integer;
  found,done : boolean;
  course : num_type;
  name : name_type;

  procedure d_inst(var inst : inst_list);

    { This procedure displays the complete instructor record so
     that the user can see if the record is to be deleted.  If the
     user chooses to delete the record then the record is removed
     from the linked list.
     }

   var
     answer : char;
     i,offset,half_quests : integer;

    begin (* d_inst *)
     writeln;
     writeln ('Instructor name: ',inst^.inst_name);
     writeln ('Instructor initial: ',inst^.inst_init);
     writeln ('Department abr: ',inst^.dept_abr);
     writeln ('Department no: ',inst^.dept_code);
     writeln ('Course number: ',inst^.course_num);
     writeln ('Section number: ',inst^.sect_num);
     writeln ('No. of questions: ',inst^.num_of_quest);
     offset := (max_quest_nums div 2) + max_quest_nums mod 2;
     half_quests := max_quest_nums div 2;
     with inst^ do
      begin
       for i := 1 to half_quests do
        begin
         write ('  ',i:2,') ',quest_nums[i]);
         writeln (' ':10,i+offset:2,') ',quest_nums[i+offset]);
        end;
       if odd(max_quest_nums)
       then
       writeln ('  ',half_quests+1:2,') ',quest_nums[half_quests+1])
      end;
     writeln;
     write ('Do you wish to delete this instructor? (Y or N) ');
     readln (answer);
```

```
    if (answer = 'y') or (answer = 'Y')
    then
    inst := inst^.next
   end; (* d_inst *)

begin (* delete instructor *)
 done := false;
 writeln;
 write ('Enter instructor''s name being deleted: ');
 get_name (name);
 write ('Enter instructor''s course number: ');
 get_num (c_num);
 temp_i_ptr := head_inst;
 convert3 (c_num,course);
 (* check if first instructor *)
 if (course = temp_i_ptr^.course_num) and
 (name = temp_i_ptr^.inst_name)
 then
 d_inst (head_inst)
 else
  begin
   found := false;
    repeat { until end of list }

     { find the instructor record }

     while (temp_i_ptr^.next^.next <> nil) and
     (course <> temp_i_ptr^.next^.course_num) and
     (name <> temp_i_ptr^.next^.inst_name) do
     temp_i_ptr := temp_i_ptr^.next;
     if (course = temp_i_ptr^.next^.course_num) and
     (name = temp_i_ptr^.next^.inst_name)
     then
      begin
       found := true;
       d_inst (temp_i_ptr^.next)
      end;
     if (temp_i_ptr^.next = nil)
     then
      begin
       temp_i_ptr := head_inst;
       done := true
      end
     else
      if (temp_i_ptr^.next^.next <> nil)
      then
       temp_i_ptr :=temp_i_ptr^.next
    until ((temp_i_ptr^.next^.next = nil) or done);
  if not found
  then
  writeln ('Instructor ',name,' not found.')
```

```
    end
  end; (* delete instructor *)

 procedure print_inst (var instructor : inst_list);

   (* This procedure was written to help in making the header cards
    that go on the top of the student's answer cards.  The header
    cards consist of the department number, the course number, and
    the section number.  This card is then used in the report file
    to find the instructors picked questions.
    This program will print out the department number, the
    course number, the section number, the instructor's name, the
    department and the batch number.  The output of this program is
    formatted so that corrections and deletions can be made to the
    instructor data file.

    The input file to this program is the sorted instructor data
    file.  This file should be sorted on the following keys, the
    department number, the course number, and the section number.

    The output file is a temporary file that is handy to have for
    the data entry personal to check there scantron header cards.
    *)

 var
   linecount,pagenum : integer;
   temp_ptr : inst_list;

   procedure print_heading (page_num : integer);

     { This procedure will print the heading for the instructor
       report file.
       }

   var
     i : integer;

    begin
     writeln (out_inst);
     writeln (out_inst,' ':60,'page ',page_num:2);
     write (out_inst,' ':3,'Dept. no  ','course no ',' sect. no ');
     write (out_inst,'  instructor     ','forms',' d. abr');
     writeln (out_inst,' ':2,'prtd');
     for i := 1 to 70 do
     write (out_inst,'*');
     writeln (out_inst);
     writeln (out_inst)
    end;

   procedure write_line (var instrt : inst_list);
```

```
    { This procedure writes a complete instructor record to the
     instructor report file.
     }

  var
    i : integer;

   begin
    with instrt^ do
     begin
      write (out_inst,' ':6,dept_code,' ':6,course_num);
      write (out_inst,' ':7,sect_num);
      write (out_inst,' ':5,inst_init,' ',inst_name,' ');
      write (out_inst,num_of_quest,' ':3,dept_abr);
      write (out_inst,' ':4,print_flag,chr(13));
      line (70,'_',out_inst);
      writeln (out_inst);
      for i := 1 to (max_quest_nums div 2) do
      write (out_inst,quest_nums[i],' ');
      writeln (out_inst);
      for i := (max_quest_nums div 2 + 1) to max_quest_nums do
      write (out_inst,quest_nums[i],' ');
      writeln (out_inst);
      line (70,'=',out_inst);
      writeln (out_inst);
     end
   end; { print_heading }

begin (* print_inst *)
 rewrite (out_inst,'instr.rpt');
 writeln;
 writeln ('Created file instr.rpt');
 writeln;
 temp_ptr := instructor;
 pagenum := 1;

 { while the instructor list is not empty
  perform the following loop. }

 while (temp_ptr <> nil) do
  begin
   linecount := 0;
   print_heading (pagenum);
   while (linecount <= 50) and (temp_ptr <> nil) do
    begin
     write_line (temp_ptr);
     linecount := linecount + 4;
     temp_ptr := temp_ptr^.next
    end;
   page (out_inst);
   pagenum := pagenum + 1
```

```
    end
  end; (* print_inst *)

 procedure dump_inst (var head_inst : inst_list);

   {  This procedure writes the updated record to the instructor
   data base file.
    }

 var
   temp_i_ptr : inst_list;
   i : integer;

  begin { dump_inst }
   { rewrite the instructor file }
   rewrite (out_inst,'inst.srt');
   temp_i_ptr := head_inst;
   while (temp_i_ptr <> nil) do
    begin
     with temp_i_ptr^ do
      begin
       write (out_inst,dept_code,course_num,sect_num);
       write (out_inst,inst_init,inst_name,dept_abr);
       write (out_inst,print_flag,num_of_quest);
       for i := 1 to max_quest_nums do
       (* write instructor picked questions *)
       write (out_inst,quest_nums[i]);
       writeln (out_inst)
      end;
     temp_i_ptr := temp_i_ptr^.next
    end
  end; { dump_inst }

 procedure reset_files (var head_list : inst_list);

  begin { reset_files }
   dump_inst (head_list);
  end; { reset_files }


 procedure heading;

   {  This procedure prints out the heading and the menu
   of options for this program.
    }

  begin { heading }
   writeln;
   writeln ('This program modifies the list of instructors');
   writeln ('using the faculty evaluation system.  This program');
   writeln ('contains the following options: ');
```

```
    writeln ('  1) A - add an instructor');
    writeln ('  2) D - delete an instructor');
    writeln ('  3) P - creates a printable instructor file');
    writeln ('  4) ? - prints this menu');
    writeln
   end; (* heading *)

 begin (* main *)

  get_forms (head_form);
  get_instruct_info (head_inst);

  heading;

  changes := 0;
   repeat (* until you want to stop *)
    if (changes = 10)
    then
     begin
      writeln ('Wait reseting file');
      changes := 0;
      reset_files (head_inst)
     end
    else
    changes := changes + 1;
    write ('Enter option : (A,D,P,?) ');
    readln (option);
     case option of
      'a','A' :
             add_inst (head_inst);
      'd','D' :
             delete_inst (head_inst);
      'p','P' :
             print_inst (head_inst);
      '?' :
             heading;
      others :
             begin
              writeln;
              writeln ('Invalid command')
             end
     end; (* case *)
    writeln;
    write ('Do you want to continue? (Y or N) ');
    readln (option)
   until (option = 'n') or (option = 'N');
  dump_inst (head_inst)
 end.
(* main *)
```

```
program print_questions;

{  Written by: Peter Weiler
 last revised: May, 1983

 This program creates the instructor's evaluation form.
 The routine will also create a file for printing out the
 questionnaire forms.

 The information for the instructor data base is stored in the
 file 'INST.SRT' this file should be sorted when the program reads
 it in.  The input data file is in the following format:

 dept_code : field (1 - 4)
 course_num : field (5 - 7)
 sect_num : field (8 - 11)
 inst_init : field (12)
 inst_name : field (13 - 26)
 dept_abr : field (27 - 31)
 print_flag : field (32 - 36)
 num_of_quest : field (37 - 39)
 quest_nums : field (40 - 131)

 The routine reads in the questions for the questionnaires
 from a file 'QUEST.DTA'.  This file is set up in the following
 format:

 key : field(1 - 4) the question number
 string1 : field(5 - 47) first half of the question
 string2 ; field(47 - 90) second half of the question

 The question data base will be read into a hash table so
 that the questions can be accessed rapidly.

 The program will create a file call 'PRCMD.CMD' this file
 will be a print commands file.  The file will be used to
 submit the print requests with all of the appropriate
 switches.

 This routine will create a file for each questionnaire for
 a file,'BAT.NUM', will be used to keep track of the
 questionnaire file number.  The questionnaire forms will be
 written to a subdirectory with the logical name of 'RPT:'.
 }

const
  key_length = 4;
  num_length = 3;
  max_quest_nums = 23;
  name_length = 14;
  d_abr_length = 5;
```

```
    string_length = 43;
    max_tot_quest = 9999;

  type

    key_type = packed array [1..key_length] of char;

    num_type = packed array [1..num_length] of char;

    string_type = packed array [1..string_length] of char;

    questions = array [1..max_quest_nums] of key_type;

    quest_list = ^quest_type;

    quest_type = record
                   key : key_type;
                   quest1_string : string_type;
                   quest2_string : string_type
                 end;

    { question list table }
    q_tab_type = array [1..max_tot_quest] of quest_list;

    name_type = packed array [1..name_length] of char;

    d_abr_type = packed array [1..d_abr_length] of char;

    inst_list = ^inst_rec;

    (* The instructor record is read in from the file inst.srt *)
    inst_rec = record
                 dept_code : packed array [1..4] of char;
                 course_num : num_type;
                 sect_num : num_type;
                 inst_init : char;
                 inst_name : name_type;
                 dept_abr : d_abr_type;
                 print_flag : char;
                 num_of_quest : num_type;
                 quest_nums : questions;
                 next : inst_list
               end;

    file_type_string = packed array [1..14] of char;

  var
    quest_file,prcmd_fil,inprcmd : text;
    instr_file,out_inst,out_q,batch : text;
    inst_head : inst_list;
    quest_table : q_tab_type;
```

```
out_string : file_type_string;

procedure init_table (var q_tab : q_tab_type);

  {  This procedure initializes the pointers in the question
   table to be nil.
   }

var
  i : integer;

 begin { init_table }
  for i := 1 to max_tot_quest do
  q_tab[i] := nil
 end; { init_tab }


procedure get_num(var key : key_type;var num : integer);

  {  This procedure will convert an array [1..4] of digits
   to an integer number.
   }

var
  i : integer;

 begin { get_num }
  num := 0;
  for i := 1 to key_length do
  num := num * 10 + (ord(key[i]) - ord('0'))
 end; { get_num }

procedure get_out_file (var outfile : text);

  (* This procedure will create the output files for the
   questionnaire forms , it will also increment the batch number
   in the batch file so that each call to this program increments
   this number. *)

var
  batch_num : integer;

  procedure init_out_string (var out_string : file_type_string);

    {  This procedure initializes the name of the file that
     will be used to place the questionnaire form in.
     }

   begin { init_out_string }
    out_string := 'RPT:QU0000.DTA'
   end; { init_out_string }
```

```
  begin (* get_out_file *)
   (* set batch number *)
   (* make sure batch is initialized to zero *)

   reset (batch,'bat.num');
   if eof(batch)
   then
   batch_num := 0 { if the file is not there initialize }
   else
   read (batch,batch_num);
   batch_num := batch_num + 1;
   rewrite (batch,'bat.num');
   writeln (batch,batch_num);

   (* create a file name for the output file *)

   init_out_string (out_string);
   out_string[7] := chr(batch_num div 1000 + ord('0'));

   { insert file number }

   out_string[8] := chr((batch_num div 100) mod 10 + ord('0'));
   out_string[9] := chr((batch_num div 10) mod 10 + ord('0'));
   out_string[10] := chr(batch_num mod 10 + ord('0'));
   rewrite (outfile,out_string)
  end; (* get_out_file *)

procedure build_question_list(var q_tab : q_tab_type);

  {  This procedure will create the table of questions that
   will be used in the questionnaire forms.  The routine will
   set up the table to be indexed by the question's number.
   }

var
  q_rec : quest_list;
  index : integer;

  procedure get_quest (var q_rec : quest_list;var qfile : text);

   (* This procedure will read in one question from the question
     file. *)

   begin { get_quest }
    with q_rec^ do
     begin
      read (quest_file,key);
      readln (quest_file,quest1_string,quest2_string)
     end
   end; (* get quest *)
```

```
  begin (* build question list *)
   (* get all of the questions in the data pool *)
   reset (quest_file,'quest.dta');
   while not eof (quest_file) do
    begin
     new (q_rec);
     get_quest (q_rec,quest_file);
     get_num (q_rec^.key,index);
     q_tab[index] := q_rec
    end
  end; (* build_data_base *)

 procedure get_rec (var rec : inst_list;var ins : text);

   (* This procedure will read in the information on
    one instructor. *)
 var
   i : integer;

  begin (* get_rec *)
   new (rec);
   with rec^ do
    begin
     read (ins,dept_code,course_num,sect_num);
     read (ins,inst_init,inst_name,dept_abr);
     read (ins,print_flag,num_of_quest);
     for i := 1 to max_quest_nums do
     (* get instructor picked questions *)
     read (ins,quest_nums[i]);
     readln (ins);
     next := nil
    end
  end;  (* get_rec *)

 procedure get_instruct_info(var head_inst_list : inst_list);

   (* This procedure builds the linked list of instructor
    information. The instructor file is assumed to be sorted
    according to department, course, and section number.
    *)

 var
   temp,rec : inst_list;
   eof_flag : boolean;

  begin (* get_instruct_info *)
   (* sorted instructor information file *)
   reset (instr_file,'inst.srt');
   if not eof (instr_file)
   then
```

```
    begin
     get_rec (head_inst_list,instr_file);
     temp := head_inst_list;
     (* get all instructor information *)
     while not eof (instr_file) do
      begin
       get_rec (rec,instr_file);
       temp^.next := rec;
       temp := temp^.next
      end;
     eof_flag := false
    end
   else
   eof_flag := true
 end; (* get_instruct_info *)

procedure dump_inst (var head_inst : inst_list);

   { This procedure will write the updated instructor list
    back to the instructor file 'INST.SRT'. The file
    has been updated with the print flag.
    }

var
   temp_i_ptr : inst_list;
   i : integer;

 begin { dump_inst }
  { rewrite the instructor file }
  rewrite (out_inst,'inst.srt');
  temp_i_ptr := head_inst;
  while (temp_i_ptr <> nil) do
   begin
    with temp_i_ptr^ do
     begin
      write (out_inst,dept_code,course_num,sect_num);
      write (out_inst,inst_init,inst_name,dept_abr);
      write (out_inst,print_flag,num_of_quest);
      for i := 1 to max_quest_nums do
      (* write instructor picked questions *)
      write (out_inst,quest_nums[i]);
      writeln (out_inst)
     end;
    temp_i_ptr := temp_i_ptr^.next
   end
 end; { dump_inst }

procedure get_commands;

  { This procedure opens the file that will contain all
   of the print commands
```

```
    }

 var
   ch : char;

  begin
   rewrite (prcmd_fil,'prcmd.cmd');
  end; { get_commands }


 procedure print_heading (var inst_head : inst_list;
                          var out_head : text);

   { This procedure will print the heading that will go on the
    top of the questionnaire form. The routine will then write
    the appropriate number of blank lines so that when the
    questions are printed to the file they will appear in the
    correct place on the questionnaire form.
    }

 var
   i : integer;

  begin { print_heading }
   with inst_head^ do
    begin
     { print down to position }
     writeln (out_head);
     writeln (out_head);
     writeln (out_head);

     write (out_head,'  ',inst_init,' ',inst_name,'    ');
     write (out_head,dept_abr,'  ',dept_code,'  ');
     write (out_head,course_num,'  ',sect_num);
     writeln (out_head);

     { print blank lines down to question section }
     for i := 1 to 10 do
     writeln (out_head)
    end
  end; { print_heading }

 procedure print_quest (var inst_head : inst_list;
                        var q_tab : q_tab_type;
                        var out_quest : text);

   { This procedure will print the questions that are in the
    instructor's record onto the file that will be printed for
    his questionnaire form.
    }
```

```
 var
   index,q_num : integer;
   done : boolean;

  begin
   done := false;
   index := 1;
   while (not done) and
   (inst_head^.quest_nums[index] <> '0000') do
    begin
     get_num (inst_head^.quest_nums[index],q_num);

     { If the question is not in the table print
      a blank line }

     if (q_tab[q_num] = nil)
     then
      begin
       writeln (out_quest);
       writeln (out_quest)
      end
     else
      begin
       writeln (out_quest,' ':6,q_tab[q_num]^.quest1_string);
       writeln (out_quest,' ':6,q_tab[q_num]^.quest2_string)
      end;
     index := index + 1;
     if (index = 24)
     then
      begin
       index := 23;
       done := true
      end
    end;
   page (out_quest)
  end; { print_questions }

procedure print_cmd (var inst_head : inst_list;
                     var prcmd : text);

  { This procedure will create the print commands file for
   the questionnaire form. The procedure will create multiple
   print requests for instructor's who have more than 300
   questionnaire forms. The maximum number of copies that the
   procedure will allow in any print request is 300 copies.
   }

var
  copies : integer;
  cp_flag : boolean;
```

```
  procedure print_line (var inst_head : inst_list;
                        number : integer;
                        var prcmd : text);

    { This procedure will print the command line to print
     out a questionnaire form. The routine receives the
     name of the file to be printed,'out_string'.
     }

   begin { print_line }
    write (prcmd,'print ',out_string,'/copies:',number:4);
    write (prcmd,'/noheader /forms:eval /note:"burst&hold"');
    if cp_flag
    then
    writeln(prcmd)
    else
    writeln (prcmd,'/delete')
   end; { print_line }

  procedure get_num (var num_string : num_type;
                     var number : integer);

    { This procedure will convert an array of digits [1..4]
     to an integer number.
     }

  var
    i : integer;

   begin { get_num }
    number := 0;
    for i := 1 to num_length do
    number := number * 10 + (ord(num_string[i]) - ord('0'))
   end; { get_num }

begin { print_cmd }
 get_num (inst_head^.num_of_quest,copies);
 cp_flag := false;
 while (copies > 0) do
  begin
   if (copies <= 300)
   then
    begin
     print_line(inst_head,copies,prcmd);
     copies := 0
    end
   else
    begin
     print_line(inst_head,300,prcmd);
     copies := copies - 300
    end;
```

```
      cp_flag := true
     end
   end; { print_cmd }

  procedure print_info (var inst_head : inst_list;
                        var q_tab : q_tab_type);

    { This procedure will call the appropriate subroutines
     to print both the questionnaire form and the print command
     file. The routine will create a maximum of 100 forms
     at a time so the print queue will not be overloaded.
     }

  var
    temp_i_ptr : inst_list;
    i : integer;

   begin { print_info }
    i := 0;
    temp_i_ptr := inst_head;
    while (temp_i_ptr <> nil) and (i < 100) do
     begin
      if (temp_i_ptr^.print_flag = '0')
      then
       begin
        i := i + 1;
        get_out_file (out_q);
        print_heading (temp_i_ptr,out_q);
        print_quest (temp_i_ptr,q_tab,out_q);
        print_cmd (temp_i_ptr,prcmd_fil);
        temp_i_ptr^.print_flag := '1';
       end;
      temp_i_ptr := temp_i_ptr^.next
     end;
    if (i = 100)
    then
     begin
      writeln ('100 questionnaire forms created. Rerun the');
      writeln ('program after the files have been printed.')
     end
    else
    writeln (i:4,' questionnaire forms created.')
  end; { print_info }

begin { main }

 init_table (quest_table);
 build_question_list (quest_table);
 get_instruct_info(inst_head);
 get_commands;
```

```
 print_info (inst_head,quest_table);

 dump_inst (inst_head)
end.
```

```
program calculate ;

(* Written by   Peter Weiler
 date last revised: May 1983

 This program will compute statistics for the faculty evaluation
 scantron cards.  It will search for the scantron files and
 generate the statsistics for the files that it finds.  If a file
 is not found then it will go on to the next file.

 The scantron files will be named 'FILEn.SCN' where n is a
 number from (0..9).  The scantron files will contain the
 codes for the different positions that were marked on the
 scantron card.  The program will interprete the codes so
 that it can compute the statistics files.

 The output files will be written to a subdirectory 'STS:'
 A file containing the file number will be used to keep
 track of the different statistics files created.  The
 statistics files will be named 'INnnnn.dta' where
 the field 'nnnn' will be a number from '0001' to '9999'.
 *)

const
  max_quest = 33;
  min_quest = 10;
  head_length = 11;
  min_file_num = 0;
  max_file_num = 9;

type

  { converted questionnaire answers }
  line_type = array [1..max_quest] of integer;

  { A list of all the questionnaire results for an instructor }
  list_type = ^info_type;

  info_type = record
                line : line_type;
                next : list_type
              end;

  result = array [1..max_quest] of real;

  { file identification record (department,course,
   and section number. }
  head_type = packed array [1..head_length] of char;

  { name of input file }
  file_type_string = packed array [1..10] of char;
```

```
  { name of output file }
  outfile_type_string = packed array [1..14] of char;

var
  batch,infile,outfile : text;
  header :head_type;
  head_conv_tab : array [0..31] of char;
  head_list : list_type;
  freq : array [1..max_quest,1..5] of integer;
  means, standard_dev : result;
  tot_ans_line : line_type;
  file_count : integer;
  file_there : boolean;
  file_string : file_type_string;
  out_string : outfile_type_string;
  error_flag : boolean;

  procedure init_head_conv_tab;

    (* This procedure sets up a table that contains the possible
     values for a header card line. The values were obtained
     from the manual on the scantron card reader.
     *)

   begin
    head_conv_tab[0]  := '0';        head_conv_tab[16] := '5';
    head_conv_tab[1]  := '1';        head_conv_tab[17] := '6';
    head_conv_tab[2]  := '2';        head_conv_tab[18] := '7';
    head_conv_tab[3]  := '3';        head_conv_tab[19] := '8';
    head_conv_tab[4]  := '3';        head_conv_tab[20] := '8';
    head_conv_tab[5]  := '4';        head_conv_tab[21] := '9';
    head_conv_tab[6]  := '5';        head_conv_tab[22] := '@';
    head_conv_tab[7]  := '6';        head_conv_tab[23] := '@';
    head_conv_tab[8]  := '4';        head_conv_tab[24] := '9';
    head_conv_tab[9]  := '5';        head_conv_tab[25] := '@';
    head_conv_tab[10] := '6';        head_conv_tab[26] := '@';
    head_conv_tab[11] := '7';        head_conv_tab[27] := '@';
    head_conv_tab[12] := '7';        head_conv_tab[28] := '@';
    head_conv_tab[13] := '8';        head_conv_tab[29] := '@';
    head_conv_tab[14] := '9';        head_conv_tab[30] := '@';
    head_conv_tab[15] := '@';        head_conv_tab[31] := '@';
   end; (* init head conv table *)

  procedure init_array (var l_array : line_type);

    (* initialize array to hold answers to questions *)

  var
    i : integer;
```

```
 begin
  for i := 1 to max_quest do
  l_array[i] := 0
 end; (* init array *)

procedure init_results;

  (* initialize  statistics arrays *)

var
  i,j : integer;

 begin
  for i := 1 to max_quest do
   begin
    tot_ans_line[i] := 0;
    means[i] := 0.0;
    standard_dev[i] := 0.0;
    for j := 1 to 5 do
    freq[i,j] := 0
   end
 end; (* init results *)

procedure get_out_file (var outfile : text);

  (* This procedure will create the output files for the
   statistics , it will also increment the batch number in the
   batch file so that each call to this program increments this
   number. *)

var
  batch_num : integer;

  procedure init_out_string (var out_string : outfile_type_string);

    { This procedure will initialize the string that will
     contain the name for the output file.
     }

   begin { init_out_string }
    out_string := 'sts:in0000.dta';
   end; { init_out_string }

 begin (* get_out_file *)
  (* set batch number *)
  (* make sure batch is initialized to zero *)
  reset (batch,'batch.num');
  if eof (batch)
  then
  batch_num := 0
  else
```

```
    read (batch,batch_num);
    batch_num := batch_num + 1;
    rewrite (batch,'batch.num');
    writeln (batch,batch_num);
    (* create a file name for the output file *)
    init_out_string (out_string);

    { set the number of the file }

   out_string[7] := chr(batch_num div 1000 + ord('0'));
   out_string[8] := chr((batch_num div 100) mod 10 + ord('0'));
   out_string[9] := chr((batch_num div 10) mod 10 + ord('0'));
   out_string[10] := chr(batch_num mod 10 + ord('0'));
   rewrite (outfile,out_string)
  end; (* get_out_file *)

 procedure get_files (file_count : integer;
                      var file_there : boolean;
                      var infile,outfile : text);

   (* This procedure will get the scantron file with the number
    that was passed to it.  If the file was found then a true
    value is returned. *)

 var
  i : integer;

 begin  (* get_files *)
  file_string := 'FILE0.SCN ';
  file_string[5] := chr(file_count + ord('0'));
  file_there := false;
  reset (infile,file_string);
  if not eof (infile)
  then
   begin
    get_out_file (outfile);
    file_there := true
   end
 end; (* get files *)

procedure get_header (var top : head_type);

  (* This program converts then header card into integer numbers
   from the scantron code. *)

var
  i : integer;

 begin { get_header }
  readln (infile,top);
  for i := 1 to head_length do
```

```
    if ((ord(top[i])-ord('@')) > 31)
    then
    top[i] := head_conv_tab[ord(top[i])-ord('@')-32]
    else
    top[i] := head_conv_tab[ord(top[i])-ord('@')]
   end; (* get_header *)

 procedure get_card (var line : line_type);

    (* This procedure will convert the scantron code on a card into
     integer numbers.  A card is one student's answers to the
     questionnaire form.
     *)

 var
    i : integer;
    header : head_type;
    card : array [1..max_quest] of char;

  begin { get_card }

    { Transpose input file since cards are read backward }
    for i := max_quest downto 1 do
    read (infile,card[i]);
    readln (infile);

    { The values for conversion are the reverse of those stated
     in the scantron manual because of the way they are read in. }
    for i := 1 to max_quest do
     case card[i] of
      '@' :
            line[i] := 0;
      'A' :
            line[i] := 5;
      'B' :
            line[i] := 4;
      'D' :
            line[i] := 3;
      'H' :
            line[i] := 2;
      'P' :
            line[i] := 1;
      others :
            line[i] := -1
    end
  end; (* get_card *)

 procedure get_info;

    (* This procedure will get all of the answer cards that are
     in a given file and put them into a linked list. *)
```

```
var
  quest_number : integer;
  list : list_type;

 begin { get_info }
  init_head_conv_tab;
  head_list := nil;
  error_flag := false;
  get_header (header);

  { if the file contains only a header print an error }

  if eof (infile)
  then
   begin
    error_flag := true;
    writeln;
    writeln ('File ',file_string,' contains no data, rerun')
   end
  else
  while not eof(infile) do
   begin
    new (list);
    init_array ( list^.line );
    get_card (list^.line);
    list^.next := head_list;
    head_list := list;
   end
 end;  (* get_info *)

procedure compute_stats;

  (* This procedure computes the frequency, mean, and standard
   deviation for each of the questions.  All zero values are
   discarded. *)

var
  temp_list : list_type;
  quest_number,sum,sumsqr : integer;

 begin { compute_stats }
  init_results;

  { compute stats for all questions }

  for quest_number := 1 to max_quest do
   begin
    temp_list := head_list;
    sum := 0;
    sumsqr := 0;
```

```
    { compute stats for a single question }

    while temp_list <> nil do
     begin

      { if the answer is valid compute stats }

      if (temp_list^.line[quest_number] > 0) and
      (temp_list^.line[quest_number] < 6)
      then
       begin
        freq[quest_number,temp_list^.line[quest_number]] :=
        freq[quest_number,temp_list^.line[quest_number]] + 1;
        sum := sum + temp_list^.line[quest_number];
        sumsqr := sumsqr + sqr(temp_list^.line[quest_number]);
        tot_ans_line[quest_number] := tot_ans_line[quest_number]+1
       end;
      temp_list := temp_list^.next
     end; (* while *)
    if (sum <> 0.0) and (sumsqr <> 0.0) and
    (tot_ans_line[quest_number] <> 0) and
    (tot_ans_line[quest_number] <> 1)
    then
     begin
      means[quest_number] := sum / tot_ans_line[quest_number];
      standard_dev[quest_number] := sqrt((sumsqr - sqr(sum)/
                                tot_ans_line[quest_number]) /
      (tot_ans_line[quest_number] - 1))
     end
   end (* for *)
 end; (* compute_stats *)

procedure print_results;

  (* This procedure will print the statistics out to the
   appropriate  file.  The file number is changed for each given
   run of print results. *)

var
  quest_number,num_quest,i : integer;

 begin
  (* determine the number of questions in the file *)
  quest_number := max_quest;
  num_quest := min_quest;
  writeln (outfile,header);

  { compute number of results to print out. }

  while (quest_number > min_quest) and (num_quest = min_quest) do
```

```
    if tot_ans_line[quest_number] <> 0
    then
    num_quest := quest_number
    else
    quest_number := quest_number - 1;

    { write the results out }

    for quest_number := 1 to num_quest do
     begin
      for i := 1 to 5 do
      write (outfile,freq[quest_number,i]:4);
      write (outfile,means[quest_number]:10:5);
      write (outfile,' ':5,standard_dev[quest_number]:10:3);
      writeln (outfile)
     end  (* for *)
   end; (* print_results *)

begin (* main *)

 { For all possible scantron files generate statistics
  files for them. }

 for file_count := min_file_num to max_file_num do
  begin
   get_files (file_count,file_there,infile,outfile);
   if file_there
   then
    begin
     get_info;
     writeln;
     write ('Input file is ',file_string,' output file is ');
     writeln (out_string);
     if not error_flag
     then
      begin
       compute_stats;
       print_results
      end
    end
  end
end.
```

```
program report;

(* Program report generator
 Written by Peter Weiler
 for : faculty evaluation
 University of Montana

 This program will produce the reports to the answers given by
 the students to the faculty evaluation questions.  The report
 consists of the questions that the instructor picked and the
 results to them.
 *)

(* The following files are needed to run this program:

 The report generator will read in the following files:

 inst.srt  :  This file contains all of the instructor information.
 The file has to be sorted according to the department
 number, the course number, and the section number
 before it can be used.  The format of the files is as follows:

 dept_code : field (1 - 4)
 course_num : field (5 - 7)
 sect_num : field (8 - 11)
 inst_init : field (12)
 inst_name : field (13 - 26)
 dept_abr : field (27 - 31)
 print_flag : field (32 - 36)
 num_of_quest : field (37 - 39)
 quest_nums : field (40 - 131)

 The information will be put into a tree with the
 following pointer fields:

 dept_ptr : will point to the next department
 class_ptr : will point to the next class of that
 particular department.
 sect_ptr : will point to the next section of the class
 Each of the sections are ordered according to the
 teachers name.  This will be used when the files are
 being run separately, (which will be the case were
 two people teach the same class.

 The routine reads in the questions for the questionnaires
 from a file 'QUEST.DTA'.  This file is set up in the following
 format:

 key : field(1 - 4) the question number
 string1 : field(5 - 47) first half of the question
 string2 ; field(47 - 90) second half of the question
```

```
   The question data base will be read into a hash table so
   that the questions can be accessed rapidly.

   INnnnn.dta : This file is the statistics about each question
   that the instructor asked.  The first record in this
   file is a record which tells the department number,
   class number and section number of the data.
   The statistics file will contain have seven real numbers
   for the statistics to each question.  The first five
   real numbers are the frequency of each answer to the question
   the sixth number is the mean and the last number is
   the stanard deviation of the answers to the question.

   The following output files will be generated:

   OTnnnn.dta : The report for the instructor and the report for the
   Faculty Evaluation Committee.

   ERROR.FIL : this file will contain a list of the files where there
   was more than one instructor teaching the class.

   The error file and the report files will be printed
   in a subdirectory with the logical name 'RPT:'.
   *)

const
  star = '*';
  under = '_';
  key_length = 4;
  num_length = 3;
  max_quest_nums = 23;
  name_length = 14;
  d_abr_length = 5;
  string_length = 43;
  max_tot_quest = 9999;
  max_global = 10;

type

  key_type = packed array[1..key_length] of char;

  q_num_type = key_type;

  num_type = packed array [1..num_length] of char;

  string_type = packed array [1..string_length] of char;

  questions = array [1..max_quest_nums] of key_type;

  name_type = packed array [1..name_length] of char;
```

```
d_abr_type = packed array [1..d_abr_length] of char;

res_type = (ex_poor,agree);

inst_list = ^inst_rec;

(* The instructor record is read in from the file inst.srt *)
inst_rec = record
             dept_code : packed array [1..4] of char;
             course_num : num_type;
             sect_num : num_type;
             inst_init : char;
             inst_name : name_type;
             dept_abr : d_abr_type;
             print_flag : char;
             num_of_quest : num_type;
             quest_nums : questions;
             dept_ptr : inst_list;
             course_ptr : inst_list;
             sect_ptr : inst_list
           end;

quest_list = ^quest_type;

(* The question type is read in in half fields so that the
 different parts can be listed on different lines. *)

quest_type = record
               key : key_type;
               quest1_string : string_type;
               quest2_string : string_type
             end;

{ the question table type }
q_tab_type = array [1..max_tot_quest] of quest_list;

(* The header card is used to find the instructor's information
 in the list of instructor records.  This is the first card in
 the stats file. *)

header_type = record
                dept_code : packed array [1..4] of char;
                course_num : packed array [1..3] of char;
                sect_num : packed array [1..3] of char
              end;


(* The stats record is the structure generated by the stats
 program.  This is the structure of the information that
 follows the header card. *)
```

```
  stats_type = record
                 freq1,freq2,freq3,freq4,freq5 : integer;
                 mean,stand_dev : real
               end;

  global_stats = array [1..max_global] of stats_type;

var
  err_file : text;
  stats : text;
  quest_file : text;
  instrt : text;
  outfile : text;
  head_inst_list : inst_list;
  quest_table : q_tab_type; (* question table *)
  quest : char;


  procedure get_num(var key : key_type;var num : integer);

    { This procedure will convert an array [1..4] of digits
     into an integer number.
     }

  var
    i : integer;

   begin { get_num }
    num := 0;
    for i := 1 to key_length do
    num := num * 10 + (ord(key[i]) - ord('0'))
   end; { get_num }

  procedure get_number (var num : integer);

    { This procedure will read in digits from the terminal
     the routine will then convert the digits into an integer
     number. The routine checks to see that only valid characters
     are enter. If the user types a character other than (0..9)
     the routine will have the user reenter the number.
     }

  var
    correct : boolean;
    ch : char;

   begin { get_number }
     repeat { until correct }
      correct := true;
      num := 0;
```

```
      repeat { until wrong or eoln }
       ch := input^;
       get (input);
       if (ch >= '0') and (ch <= '9')
       then
       num := num * 10 + (ord(ch) - ord('0'))
       else
        begin
         correct := false;
         readln;
         write ('invalid number reenter: ')
        end
      until (eoln or not correct);
     if correct
     then
     readln
    until correct
  end; { get_number }

 procedure get_rec (var rec : inst_list;var ins : text);

   (* This procedure will read in the information on
    one instructor. *)
 var
   i : integer;

  begin (* get_rec *)
   new (rec);
   with rec^ do
    begin
     read (ins,dept_code,course_num,sect_num);
     read (ins,inst_init,inst_name,dept_abr);
     read (ins,print_flag,num_of_quest);
     for i := 1 to max_quest_nums do
     (* get instructor picked questions *)
     read (ins,quest_nums[i]);
     readln (ins);
     dept_ptr := nil;
     course_ptr := nil;
     sect_ptr := nil
    end
  end;  (* get_rec *)

 procedure get_instruct_info (var head_inst_list : inst_list);

   (* This procedure builds the linked list of instructor
    information. The list is in the order of a three branched tree.
    In the top linked list is the list of department. Pointing
    off of each department is a linked list of each course in
    that department.  Pointing off of each course is a list
    of sections for that course.
```

```
    *)

  var
    temp,rec,dept_temp,course_temp : inst_list;

  begin (* get_instruct_info *)
   (* sorted instructor information file *)
   reset (instrt,'inst.srt');
   get_rec (head_inst_list,instrt);
   temp := head_inst_list;
   get_rec (rec,instrt);

   while not eof (instrt) do  (* get all instructor information *)
    begin
     dept_temp := temp; (* head of a department list *)

     while not eof (instrt) and
     (temp^.dept_code = rec^.dept_code) do
      begin
       course_temp := temp; (* head of a course list *)

       while not eof (instrt) and
       (temp^.course_num = rec^.course_num)
       and (temp^.dept_code = rec^.dept_code) do
        begin (* list of course sections *)
         temp^.sect_ptr := rec;
         temp := rec;
         get_rec (rec,instrt)
        end;
       if not eof (instrt) and (temp^.dept_code = rec^.dept_code)
       then
        begin (* list of courses *)
         course_temp^.course_ptr := rec;
         temp := rec;
         get_rec (rec,instrt)
        end
      end; (* course while *)
     if not eof (instrt)
     then
      begin (* list of departments *)
       dept_temp^.dept_ptr := rec;
       temp := rec;
       get_rec (rec,instrt)
      end
    end { department while }
  end; (* get_instruct_info *)

procedure build_question_list(var q_tab : q_tab_type);

   { This procedure will create the table of questions that
    will be used in the reports.  The routine will set up the
```

```
    table to be indexed by the question's number.
    }

 var
   q_rec : quest_list;
   index : integer;

   procedure init_table (var q_tab : q_tab_type);

     { This procedure will initialize the pointers in the
      question table to be nil.
      }

   var
     i : integer;

    begin { init_tab }
     for i := 1 to max_tot_quest do
     q_tab[i] := nil
    end; { init_tab }

   procedure get_quest (var q_rec : quest_list;var qfile : text);

     (* This procedure will read in one question from the question
      file. *)

    begin { get_quest }
     with q_rec^ do
      begin
       read (quest_file,key);
       readln (quest_file,quest1_string,quest2_string)
      end
    end; (* get quest *)

  begin (* build question list *)
   (* get all of the questions in the data pool *)
   reset (quest_file,'quest.dta');
   init_table(q_tab);
   while not eof (quest_file) do
    begin
     new (q_rec);
     get_quest (q_rec,quest_file);
     get_num (q_rec^.key,index);
     q_tab[index] := q_rec
    end
 end; (* build_data_base *)

procedure get_file (file_number : integer;var temp_file : text);

  (* This procedure will get an input stats file.  The number
   that is passed to it is the number of the file. *)
```

```
var
  in_string : packed array [1..14] of char;

 begin { get_file }
  in_string := 'sts:IN0000.DTA';
  in_string[7] := chr(file_number div 1000 + ord('0'));
  in_string[8] := chr((file_number div 100) mod 10 + ord('0'));
  in_string[9] := chr((file_number div 10) mod 10 + ord('0'));
  in_string[10] := chr(file_number mod 10 + ord('0'));
  reset (temp_file,in_string)
 end; (* get file *)


procedure get_header (var head : header_type;var stat:text);

  (* This procedure will read in the header card from the stats
   file.  It fills in the extra characters needed to match the
   fields with those in the instructor information records. *)

var
  ch1,ch2,ch3 : char;
 begin { get_header }
  with head do
   begin
    read (stats,ch1,ch2,ch3);
    dept_code[1] := '0';
    dept_code[2] := ch1;
    dept_code[3] := ch2;
    dept_code[4] := ch3;
    read (stat,course_num);
    readln (stat,sect_num)
   end
 end; (* get header *)

procedure find_rec (var temp : inst_list;var header : header_type;
                    var err_file : text; file_num : integer);

  (* Ths procedure will find an instructor's record in the list
   of records.  If the record is not found then an error message
   is printed to the error file and a nil value is returned in
   the pointer to the record. *)

 begin { find_rec }
  temp := head_inst_list;

  { find the list with the same department number
   as the department number in the header record. }

  while (temp^.dept_code <> header.dept_code) and
  (temp^.dept_ptr <> nil) do
```

```
    temp := temp^.dept_ptr;
    if (temp^.dept_code <> header.dept_code)
    then
     begin (* if error return a nil *)
      temp := nil;
      writeln (err_file);
      write (err_file,'Department name for input file: ');
      writeln (err_file,file_num:4,' not found')
     end
    else
     begin

      { Find the course list that has the same course
       number as the course number in the header record. }

      while (temp^.course_num <> header.course_num) and
      (temp^.course_ptr <> nil) do
      temp := temp^.course_ptr;
      if (temp^.course_num <> header.course_num)
      then
       begin (* if error return nil *)
        temp := nil;
        writeln (err_file);
        write (err_file,'Course number for input file: ');
        writeln (err_file,file_num:4,' not found')
       end
      else
       begin

        { Find the record in the section linked list that
         has the same section number as the number in the
         header record.  This record will be unique unless
         more than one instructor is teaching the class. }

        while (temp^.sect_num <> header.sect_num) and
        (temp^.sect_ptr <> nil) do
        temp := temp^.sect_ptr;
        if (temp^.sect_num <> header.sect_num)
        then
         begin (* if error return nil *)
          temp := nil;
          writeln (err_file);
          write (err_file,'Section number for input file: ');
          writeln (err_file,file_num:4,' not found')
         end
       end
     end
  end; (* find rec *)

procedure get_out_file (file_number : integer;
                        var temp_file : text);
```

```
   (* This procedure will create an output file.  The file number
    will be the same as the number for the input stats file *)

var
  out_string : packed array [1..14] of char;

 begin { get_out_file }
  out_string := 'rpt:OT0000.DTA';
  out_string[7] := chr(file_number div 1000 + ord('0'));
  out_string[8] := chr((file_number div 100) mod 10 + ord('0'));
  out_string[9] := chr((file_number div 10) mod 10 + ord('0'));
  out_string[10] := chr(file_number mod 10 + ord('0'));
  rewrite (temp_file,out_string)
 end; (* get out file *)

procedure get_global_stats ( var globals : global_stats;
                             var stats : text);

  (* This procedure will read in the statistics to the global
   questions from the statistics file *)

var
  i : integer;

 begin { get_global_stats }
  for i := 1 to max_globals do
  with globals[i] do
   begin
    read (stats,freq1,freq2,freq3,freq4,freq5);
    readln (stats,mean,stand_dev)
   end
 end; (* get global stats *)

procedure line (length : integer; ch : char; var outfile : text);

  (* The procedure will write a line for the given character,ch,
   and length, length, and write the line to the file ,outfile. *)

var
  i : integer;

 begin { line }
  for i := 1 to length do
  write (outfile,ch)
 end; (* line *)

procedure print_mean (mean : real; var outfile : text);

  (* This procedure will write an interpretation of the
   value for the mean.  The interpretation is written out
```

```
    so the reports may be interpreted easier.
    *)

  begin { print_mean }
   if (mean <= 1.4)
   then
   write (outfile,'mean is high        ')
   else
    if  (mean > 1.4) and (mean <= 2.2)
    then
     write (outfile,'mean is high ave    ')
    else
      if (mean > 2.2) and (mean <= 3.8)
      then
       write (outfile,'mean is average     ')
      else
        if (mean > 3.8) and (mean < 4.6)
        then
         write (outfile,'mean is low ave     ')
        else
         write (outfile,'mean is low         ')
 end; (* print mean *)

procedure print_con (stand : real; var outfile : text);

  (* This procedure will write an interpretation of the standard
   deviation.  The consensus means how many students agreed on a
   given answer to a question. *)

 begin { print_con }
  if (stand <= 0.57)
  then
  write (outfile,'consensus is high   ')
  else
   if (stand > 0.57) and (stand <= 1.1)
   then
    write (outfile,'consensus is average')
   else
    write (outfile,'consensus is low    ')
 end; (* print con *)

procedure print_quest (quest_num : integer;
                       var quest : quest_type;
                       response : res_type;
                       var q_stats : stats_type;
                       var outfile : text);

  (* This procedure will print the standard evaluation questions
   and the instructor picked questions. The question to be printed
   is passed as a parameter along with the question number and
   the statistice for that question.  The procedure also receives
```

```
    a flag telling it which response to print out for the
    question. *)

type
  res_string = packed array [1..11] of char;

var
  denom : real;
  high1_response,high2_response : res_string;
  low1_response,low2_response : res_string;

 begin { print_quest }

  { Set responses to the questions }

  if (response = ex_poor)
  then
   begin
    high1_response := 'Excellent  ';
    high2_response := '           ';
    low1_response := 'Very poor  ';
    low2_response := '           '
   end
  else
   begin
    high1_response := ' strongly  ';
    high2_response := '   agree   ';
    low1_response := ' strongly  ';
    low2_response := ' disagree  '
   end;
  line (72,star,outfile);
  writeln (outfile);
  with quest do
   begin

    { print the questions and the means }

    write (outfile,' ',quest_num:4,'. ',quest1_string,'*');
    writeln (outfile,'   mean    stan dev *');
    write (outfile,' ':7,quest2_string,'*  ',q_stats.mean:5:2);
    write (outfile,'     ',q_stats.stand_dev:5:2,'   *');
    write (outfile,chr(13),' ':5);
    line (67,under,outfile);
    writeln (outfile);
    with q_stats do
     begin

      { print the frequency of responses }

      write (outfile,' ':7,high1_response,freq1:4,freq2:4,freq3:4);
      write (outfile,freq4:4,freq5:4,' ',low1_response,'*');
```

```
        print_mean (mean,outfile);
        writeln (outfile,'*');
        write (outfile,' ':7,high2_response);
        denom := (freq1 + freq2 + freq3 + freq4 + freq5) / 100;
        if (denom <= 0.0)
        then
        denom := 0.01;

        { print percentages of for each response }

        write (outfile,trunc(freq1/denom):3,'%');
        write (outfile,trunc(freq2/denom):3,'%');
        write (outfile,trunc(freq3/denom):3,'%',trunc(freq4/denom):3);
        write (outfile,'%',trunc(freq5/denom):3,'% ');
        write (outfile,low2_response,'*');
        print_con (stand_dev,outfile);
        writeln (outfile,'*')
      end (* with stats *)
    end (* with question *)
  end; (* print_quest *)

procedure print_student (var ptr : inst_list;
                         var globe_stats : global_stats;
                         var outfile : text);

  (* This procedure will print out the general questions on the
   students.  A pointer to the instructor's information is passed
   to print out the heading, the answers, and the statistics for
   the report.  The routine has all of the global questions
   hard coded into itself.  *)

var
  total : real;
 begin { print_student }

  { Print the heading for the report }

  writeln (outfile);
  writeln (outfile,' ':5,'Instructor       Dept       Course Sec');
  with ptr^ do
   begin
    write (outfile,' ':5,inst_init,' ',inst_name,' ',dept_code);
    writeln (outfile,' ',dept_abr,' ',course_num,'   ',sect_num)
   end;
  writeln (outfile);
  write (outfile,' ':8,'The evaluation report consists of two');
  writeln (outfile,' parts, the first seven');
  write (outfile,' ':5,'questions give information about the');
  writeln (outfile,' students.  The remaining');
  write (outfile,' ':5,'questions evaluate the instructor and');
  writeln (outfile,' course.  In the');
```

```
write (outfile,' ':5,'evaluation questions a high rating ');
writeln (outfile,'will have a low number for');
write (outfile,' ':5,'the mean (ex. high=1 low=5).  The ');
writeln (outfile,'consensus tells how much');
write (outfile,' ':5,'agreement the students had about the');
writeln (outfile,' question.  For each');
write (outfile,' ':5,'question there is a frequency ');
writeln (outfile,'distribution of the answers and');
write (outfile,' ':5,'the percentages of students marking each');
writeln (outfile,' answer.');

(*****   Question one *****)

line (72,star,outfile);
writeln (outfile);
write (outfile,'    1. Pre-course opinion toward instructor');
write (outfile,chr(13),' ':5);
line (67,under,outfile);
writeln (outfile);
writeln (outfile,' ':5,'positive  no opinion  negative');
with globe_stats[1] do
 begin
  writeln (outfile,' ':7,freq1:4,' ':7,freq3:4,' ':7,freq5:4);
  total := freq1 + freq3 + freq5;
  if (total <= 0.0)
  then
  total := 1.0;
  write (outfile,' ':7,trunc(freq1/total*100):3,'%       ');
  write (outfile,trunc(freq3/total*100):3,'%      ');
  writeln (outfile,trunc(freq5/total*100):4,'%')
 end;

(*****   Question two *****)

line (72,star,outfile);
writeln (outfile);
write (outfile,'    2. Pre-course opinion toward course');
write (outfile,chr(13),' ':5);
line (67,under,outfile);
writeln (outfile);
writeln (outfile,' ':5,'positive  no opinion  negative');
with globe_stats[2] do
 begin
  writeln (outfile,' ':7,freq1:4,' ':7,freq3:4,' ':7,freq5:4);
  total := freq1 + freq3 + freq5;
  if (total <= 0.0)
  then
  total := 1.0;
  write (outfile,' ':7,trunc(freq1/total*100):3,'%       ');
  write (outfile,trunc(freq3/total*100):3,'%      ');
  writeln (outfile,trunc(freq5/total*100):4,'%')
```

```
    end;

   (*****   Question three *****)

   line (72,star,outfile);
   writeln (outfile);
   write (outfile,'    3. Course in :');
   write (outfile,chr(13),' ':5);
   line (67,under,outfile);
   writeln (outfile);
   writeln (outfile,' ':5,'major    minor    other');
   with globe_stats[3] do
    begin
     writeln (outfile,' ':6,freq1:4,' ':5,freq3:4,' ':5,freq5:4);
     total := freq1 + freq3 + freq5;
     if (total <= 0.0)
     then
     total := 1.0;
     write (outfile,' ':6,trunc(freq1/total*100):3,'%     ');
     write (outfile,trunc(freq3/total*100):3,'%     ');
     writeln (outfile,trunc(freq5/total*100):3,'%')
    end;

   (*****   Question four *****)

   line (72,star,outfile);
   writeln (outfile);
   write (outfile,'    4. This course was:');
   write (outfile,chr(13),' ':5);
   line (67,under,outfile);
   writeln (outfile);
   writeln (outfile,' ':5,'Required',' ':27,'Elective');
   with globe_stats[4] do
    begin
     writeln (outfile,' ':7,freq2:4,' ':17,' ':13,freq4:4);
     total := freq2 + freq4;
     if (total <= 0.0)
     then
     total := 1.0;
     write (outfile,' ':7,trunc(freq2/total*100):3,'%',' ':13);
     write (outfile,' ':17);
     writeln (outfile,trunc(freq4/total*100):3,'%')
    end;

   (*****   Question five *****)

   line (72,star,outfile);
   writeln (outfile);
   write (outfile,'    5. Sex:    Male       Female');
   write (outfile,chr(13),' ':5);
   line (67,under,outfile);
```

```
    writeln (outfile);
    with globe_stats[5] do
     begin
      writeln (outfile,' ':16,freq2:4,' ':9,freq4:4);
      total := freq2 + freq4;
      if (total <= 0.0)
      then
      total := 1.0;
      write (outfile,' ':16,trunc(freq2/total*100):3,'%',' ':9);
      writeln (outfile,trunc(freq4/total*100):3,'%')
     end;

    (*****   Question six *****)

    line (72,star,outfile);
    writeln (outfile);
    write (outfile,' ':4,'6. ');
    write (outfile,'Class: fresh  soph  junior  senior  other');
    write (outfile,chr(13),' ':5);
    line (67,under,outfile);
    writeln (outfile);
    with globe_stats[6] do
     begin
      write (outfile,' ':15,freq1:4,'  ',freq2:4,'   ',freq3:4);
      writeln (outfile,'    ',freq4:4,'     ',freq5:4);
      total := freq1 + freq2 + freq3 + freq4 + freq5;
      if (total <= 0.0)
      then
      total := 1.0;
      write (outfile,' ':15,trunc(freq1/total*100):3,'%  ');
      write (outfile,trunc(freq2/total*100):3,'%   ');
      write (outfile,trunc(freq3/total*100):3,'%    ');
      write (outfile,trunc(freq4/total*100):3,'%    ');
      writeln (outfile,trunc(freq5/total*100):3,'%')
     end;

    (*****   Question seven *****)

    line (72,star,outfile);
    writeln (outfile);
    write (outfile,'   7. ');
    write (outfile,'Expected grade :  A     B     C     D     F');
    write (outfile,chr(13),' ':5);
    line (67,under,outfile);
    writeln (outfile);
    with globe_stats[7] do
     begin
      write (outfile,' ':23,freq1:4,'  ',freq2:4,'  ',freq3:4,'  ');
      writeln (outfile,freq4:4,'  ',freq5:4);
      total := freq1 + freq2 + freq3 + freq4 + freq5;
      if (total <= 0.0)
```

```
      then
      total := 1.0;
      write (outfile,' ':23,trunc(freq1/total*100):3,'%  ');
      write (outfile,trunc(freq2/total*100):3,'%  ');
      write (outfile,trunc(freq3/total*100):3,'%  ');
      write (outfile,trunc(freq4/total*100):3,'%  ');
      writeln (outfile,trunc(freq5/total*100):3,'%')
     end;
  end; (* print student *)

 procedure print_eval (var globe_stats : global_stats;
                       var outfile : text);

   (* This procedure will create the question records for the
    evaluation questions and call the procedure to print them
    out. These question are questions 8 - 10 on the questionnaire
    form.  *)

 var
   temp_quest : quest_type;
   response : res_type;

  begin { prin_eval }
   (* begin evaluation questions *)
   response := ex_poor;

   (*****   Question eight *****)

   with temp_quest do
    begin
     quest1_string := 'Rate the course content                    ';
     quest2_string := '                                           '
    end;
   print_quest(8,temp_quest,response,globe_stats[8],outfile);

   (*****   Question nine *****)

   with temp_quest do
    begin
     quest1_string := 'Rate the instructor                        ';
     quest2_string := '                                           '
    end;
   print_quest(9,temp_quest,response,globe_stats[9],outfile);

   (*****   Question ten *****)

   with temp_quest do
    begin
     quest1_string := 'Rate the course in general                 ';
     quest2_string := '                                           '
    end;
```

```
   print_quest(10,temp_quest,response,globe_stats[10],outfile);
  end; (* print eval *)

 procedure print_global (var ptr : inst_list;
                         var globe_stats : global_stats;
                         var outfile : text);

   (* This procedure will call the routines to print out the
    results to the global questions. *)

  begin { print_global }
   print_student (ptr,globe_stats,outfile);
   print_eval (globe_stats,outfile)
  end; (* print global *)

 procedure print_instructor (var ptr : inst_list;
                             var q_tab : q_tab_type;
                             file_num : integer;
                             var stats,outfile : text);

   (* This procedure has a pointer to the instructor's information
    as input, and has the stats and output files passed to it. This
    procedure will go through the list of the instructor's picked
    questions and find them in the question list. The procedure
    print_quest is then called to print out the question *)

 var
   i,q_num : integer;
   done : boolean;
   q_stats : stats_type;
   response : res_type;

  begin { print_instructor }
   i := 1;
   done := false;
   response := agree;
   while not done and
   (ptr^.quest_nums[i] <> '0000') do
    begin
     if eof (stats)
     then
      begin
       writeln (err_file);
       writeln (err_file,'Number of questions do not match ');
       write (err_file,'the number of answers in file number: ');
       writeln (err_file,file_num:4);
       done := true

       { Note a report is produced even if the questions
        don't match. The report will halt where the
        statistics ran out. }
```

```
      end
     else
      begin
       get_num (ptr^.quest_nums[i],q_num);
       (* get statistics *)
       with q_stats do
        begin
         read (stats,freq1,freq2,freq3,freq4,freq5);
         readln (stats,mean,stand_dev)
        end;
       print_quest (i+max_global,q_tab[q_num]^,response,
       q_stats,outfile);
       i := i + 1;
       if i = 13
       then
       page (outfile);
       if i = 24
       then
        begin
         i := 23;
         done := true
        end
      end
    end
 end; (* print instructor *)

procedure print_report ( var pointer : inst_list;var stats:text;
                         file_number : integer);

  (* This procedure will print out the reports that are to go
   to both the Faculty Evaluation Committee and the instructor. *)

var
 globe_stats : global_stats;

 begin

  { Print the report for the faculty evaluation committee. }

  get_out_file (file_number,outfile);
  get_global_stats (globe_stats,stats);
  write (outfile,' ':23,'Faculty Evaluation Report');
  write (outfile,chr(13),' ':23);
  line (25,under,outfile);
  writeln (outfile);
  print_global (pointer,globe_stats,outfile);

  { print the report for the instructor. }

  page (outfile);
```

```
    write (outfile,' ':26,'Instructor''s Report');
    write (outfile,chr(13),' ':26);
    line (19,under,outfile);
    writeln (outfile);
    print_global (pointer,globe_stats,outfile);
    page (outfile);
    print_instructor (pointer,quest_table,file_number,stats,outfile)
  end; (* print report *)

procedure single_entry;

    (* This procedure will produce a report for one instructor.
     The correct department, course, and section is first found and
     then a check to see which instructor taught the class is then
     done.  This routine is used for classes where more than one
     instructor taught the class.  Error messages are sent to the
     terminal when this procedure is used instead of being sent
     to a file.  The routine will print an error message if it
     can not find the instructor's record. *)

var
    name : packed array [1..14] of char;
    temp : inst_list;
    header : header_type;
    file_number,i : integer;
    question,ch : char;

begin { single_entry }
    rewrite (err_file,'tty:');
     repeat (* until you want to quit *)
      name := '              ';
      writeln;
      writeln ('Single file entry routine:');
      write ('Enter statistics file number: ');

      (* This will be the number for the stats file *)

      get_number (file_number);
      get_file (file_number,stats);
      get_header (header,stats);

      { read in instructor's last name }

      writeln;
      write ('Enter the Instructor''s last name: ');
      ch := input^;
      get (input);
      while not eoln and not (ch in ['a'..'z','A'..'Z']) do
       begin
        ch := input^;
        get (input)
```

```
      end;
     name[1] :=ch;
     i := 2;
     while not eoln and (i <= 14) do
      begin
       name[i] := input^;
       get (input);
       i := i + 1
      end; (* get instructor name *)
     readln;

     find_rec (temp,header,err_file,file_number);
     if (temp <> nil)
     then
      begin

       { After finding the correct department, course, and section
        number find the record with the correct instructor's name. }

       while (temp^.inst_name <> name) and
       (temp^.sect_ptr <> nil) do
       temp := temp^.sect_ptr;
       if (temp^.inst_name = name) and
       (temp^.dept_code = header.dept_code) and
       (temp^.course_num = header.course_num) and
       (temp^.sect_num = header.sect_num)
       then
       print_report (temp,stats,file_number)
       else
       writeln ('Instructor''s information not in data base.')
      end;
     writeln;
     write ('If you have another entry type ,c, to continue. ');
     readln (question);
    until (question <> 'c') and (question <> 'C')
 end; (* single entry *)

procedure mult_entry;

  (* This procedure will generate the report files for any number
   of files.  The number of the low and high files are given.
   These numbers are used to get the input file name and create
   the output file.  All error messages are sent to the file
   error.fil *)

var
  header : header_type;
  temp : inst_list;
  file_num, low_file, high_file : integer;

begin { mult_entry }
```

```
    rewrite (err_file,'rpt:ERROR.FIL');
    writeln;
    write ('Enter the lowest statistics file number: ');
    get_number (low_file);
    writeln;
    write ('Enter the highest statistics file number: ');
    get_number (high_file);

    { Generate reports for all of the files in the range
     of low_file : high_file . }

    for file_num := low_file to high_file do
     begin
      get_file (file_num,stats);
      if eof (stats)
      then
       begin
        writeln (err_file);
        writeln (err_file,'File IN',file_num:4,'.dta not found')
       end
      else
       begin
        get_header (header,stats);
        find_rec (temp,header,err_file,file_num);
        if (temp <> nil)
        then
         if (temp^.sect_ptr <> nil)
         then
           if (temp^.dept_code = temp^.sect_ptr^.dept_code) and
            (temp^.course_num = temp^.sect_ptr^.course_num) and
            (temp^.sect_num = temp^.sect_ptr^.sect_num)
           then
             begin
              writeln (err_file);
              write (err_file,'Duplicate entry in file number: ');
              writeln (err_file,file_num:4);
              writeln (err_file,'run the file in single mode.')
             end
           else
            print_report(temp,stats,file_num)
         else
          print_report(temp,stats,file_num)
       end
     end
  end; (* mult entry *)

begin (* main *)

 get_instruct_info(head_inst_list);
 build_question_list(quest_table);
```

```
  writeln ('ICES Report generating program.  This program will');
  writeln ('generate reports for both the instructor and the');
  writeln ('Faculty Evaluation Committee.  The instructor''s');
  writeln ('statistics file is used to get information from the');
  writeln ('data base for the reports.');
  writeln;
  write ('Do you want single or multiple file entry? (S or M) ');
  quest := input^;
  readln;
  while (quest <> 's') and (quest <> 'S') and
  (quest <> 'm') and (quest <> 'M') do
   begin
    write ('Type S of M ');
    quest := input^;
    readln
   end;
  if (quest = 's') or (quest = 'S')
  then
  single_entry
  else
  mult_entry
end.
```

```
  program quest;

  {
   Written by: Peter Weiler
   Date last revised: May, 1983
   For: Faculty Evaluation System

   This program maintains the questionnaire file and the standard
   form file.  The program allows the user to add, delete,
   and print the questions.  The user can also modify the
   questions that are in the data base in either a single
   or multiple question mode.
   The routine allows the user to add, delete, and print
   the standard questionnaire forms.

   The routine reads in the questions for the questionnaires
   from a file 'QUEST.DTA'.  This file is set up in the following
   format:

   key : field(1 - 4) the question number
   string1 : field(5 - 47) first half of the question
   string2 : field(47 - 90) second half of the question

   The question file will be put into a linked list since
   there is not much of a speed requirement for this program.
   All questions that are added to the data base are added
   at the end of the question list.

   The instructor maintainance program also uses a file that contains
   the standard forms.  This file is called 'STAN.FRM'.  The format
   for the file is as follows:

   form number : fields(1 - 4)
   quest numbers : fields(5 - 96)

   where the question number field contains 23 question numbers with
   each question number taking up four characters.

   }

const
  string_length = 43;
  key_length = 4;
  max_quest_nums = 23;

type

  key_type = packed array [1..key_length] of char;

  string_type = packed array [1..string_length] of char;
```

```
  { question linked list }
  quest_list = ^quest_type;

  quest_type = record
                 key : key_type;
                 quest1_string : string_type;
                 quest2_string : string_type;
                 next : quest_list
               end;

  { form linked list }
  form_ptr = ^form_type;

  form_type = record
                form_num : key_type;
                quest_nums : array [1..max_quest_nums] of key_type;
                next : form_ptr
              end;

var
  quest_file,quest_outfile,outfile : text;
  form_file,forms_output : text;
  option : char;
  head_list : quest_list;
  stan_forms : form_ptr;

  procedure line (length : integer; ch : char; var outfile : text);

    (* The procedure will write a line for the given character,ch,
     and length, length.  The line will be written to outfile. *)

  var
    i : integer;

   begin { line }
    for i := 1 to length do
    write (outfile,ch)
   end; (* line *)

  procedure build_question_list(var head : quest_list);

    {  This procedure will create a linked list of all of the
     questions in the data base.  The questions will be in order
     according to the question number.
     }

  var
    temp_quest : quest_list;

    procedure get_quest (var quest : quest_list;var qfile : text);
```

```
      (* This procedure will read in one question from the question
       file. *)

     begin { get_quest }
      with quest^ do
       begin
        read (quest_file,key);
        readln (quest_file,quest1_string,quest2_string);
        next := nil
       end
     end; (* get quest *)

  begin (* build question list *)
   (* get all of the questions in the data pool *)
   reset (quest_file,'quest.dta');
   new (head);
   temp_quest := head;
   get_quest (head,quest_file);
   while not eof (quest_file) do
    begin
     new (temp_quest^.next);
     temp_quest := temp_quest^.next;
     get_quest (temp_quest,quest_file)
    end
  end; (* build_data_base *)

 procedure get_forms (var stan_forms : form_ptr);

   { This procedure will read in the standard questionnaire
    form records into a linked list.  Each standard form consists
    of a form number and 23 question numbers.
    }

 var
   i : integer;
   temp_f_ptr : form_ptr;

  begin { get_forms }
   reset (form_file,'stan.frm');
   new (stan_forms);
   temp_f_ptr := stan_forms;
   temp_f_ptr^.form_num := '0000';
   temp_f_ptr^.next := nil;
   while not eof (form_file) do
    begin
     read (form_file,temp_f_ptr^.form_num);
     for i := 1 to max_quest_nums do
     read (form_file,temp_f_ptr^.quest_nums[i]);
     readln (form_file);
     if not eof (form_file)
     then
```

```
      begin
       new (temp_f_ptr^.next);
       temp_f_ptr := temp_f_ptr^.next
      end
     else
     temp_f_ptr^.next := nil
    end
  end; { get_forms }

 procedure convert (num : integer; var key : key_type);

   {  This procedure will convert an integer number into
    and array [1..4] of digits.
    }

 var
   i : integer;

  begin { convert }
   for i := key_length downto 1 do
    begin
     key[i] := chr((num mod 10) + ord('0'));
     num := num div 10
    end
  end; (* convert *)

 procedure get_string (var string : string_type);

   {  This procedure will read in one of the strings that
    compose a question.  A question consists of two strings
    of the type read in in this routine.  The procedure
    will ignore all characters after the string length has
    been exceeded.
    }

 var
   ch : char;
   count : integer;

  begin { get_string }
   string := '';
   count := 1;
   ch := input^;
   get (input);
   if not eoln
   then
   string[1] := ch;
   while not eoln and (count < string_length) do
    begin
     count := count + 1;
     ch := input^;
```

```
      string[count] := ch;
      get (input)
     end;
    readln
   end; { get_string }

 procedure mod_question (var q_node : quest_list);

   { This procedure allows the user to modify a question. The
    procedure is passed a pointer to the question that is to be
    modified. The routine displays the question and asks the
    user if it is to be modified. If the user chooses to modify
    the question he enters in the new question.
    }

 var
   answer : char;

  begin { mod_question }
   writeln;
   with q_node^ do
    begin
     writeln (' ',key,' ',quest1_string);
     writeln (' ':6,quest2_string);
     write ('Do you want to modify this question? (Y or N) ');
     readln (answer);
     if (answer = 'y') or (answer = 'Y')
     then
      begin
       writeln;
       write ('Enter the first half of the question.');
       writeln ('|(43 char)');
       get_string(quest1_string);
       writeln;
       writeln ('Enter the second half of the question.');
       writeln ('|(43 char)');
       get_string (quest2_string);
       writeln;
      end
    end
  end; { mod_question }

 procedure mult_quest (var head_list : quest_list);

   { This procedure allows the user to modify a number of
    the existing questions in the data base. The user
    enters the start and end question numbers for the range
    of questions that he is modifying. All of the old
    questions will be overwritten.
    }
```

```
var
  q_num,start_num,stop_num : integer;
  stop_key,q_key : key_type;
  temp_q : quest_list;

begin { mult_quest }
 writeln;
 writeln ('Multiple question modification routine');
 write ('Enter starting question number: ');
 readln (start_num);
 writeln;
 write ('Enter end question number: ');
 readln (stop_num);
 writeln;
 writeln ('Each question that is entered has to be in two');
 writeln ('parts of 43 characters (or less) each.');
 temp_q := head_list;
 q_num := start_num;
 convert (q_num,q_key);
 convert (stop_num,stop_key);

 (* find the first question to be modified *)

 while (temp_q^.next <> nil) and
 (q_key <> temp_q^.key) do
 temp_q := temp_q^.next;
 while (q key <= stop_key) and
 (temp_q^.next <> nil) do
  begin
   if (q key > temp_q^.key)
   then
    if (temp_q^.next <> nil)
    then
     temp_q := temp_q^.next;

   if (q key < temp_q^.key)
   then
    begin
     q_num := q_num + 1;
     convert (q_num,q_key)
    end;
   if (q_key = temp_q^.key)
   then
    begin
     mod_question (temp_q);
     q_num := q_num + 1;
     convert (q_num,q_key)
    end
  end (* while *)
end; { mult_quest }
```

```
procedure single_quest (var head_list : quest_list);

  { This procedure allows the user to modify a single
   question. The user enters the question number of the
   question that is to be modified.  The old question will
   be overwritten by the new question.
   }

var
  q_num : integer;
  q_key : key_type;
  temp_q : quest_list;

 begin { single_quest }
  writeln;
  write ('Enter question number: ');
  readln (q_num);
  writeln ('The question that is to be entered has to be');
  writeln ('in two parts of 43 characters (or less) each.');
  (* find question *)
  convert (q_num,q_key);
  temp_q := head_list;

  { find the question that is to be modified. }


  while (temp_q^.next <> nil) and
  (q_key <> temp_q^.key) do
  temp_q := temp_q^.next;
  if (q_key = temp_q^.key)
  then
  mod_question (temp_q)
  else
  writeln ('Question ',Q_key,' not found.')
 end; (* single_quest *)

procedure delete_quest (var head_list : quest_list);

  {  This procedure allows the user to delete a question
   from the data base.  The user enters the number of the
   question to be deleted.  The procedure finds the question
   and calls a subprocedure to display and delete it.
   }

var
  temp_q : quest_list;
  q_num : integer;
  q_key : key_type;

  procedure delete (var quest : quest_list);
```

```
      { This procedure will display the question to be deleted.
       The procedure gives the user the option of deleting the
       question of returning to the main routine.
       }

    var
      answer : char;

     begin { delete }
      writeln;
      with quest^ do
       begin
        writeln (' ',key,' ',quest1_string);
        writeln (' ':6,quest2_string)
       end;
      writeln;
      write ('Do you wish to delete this question? (Y or N) ');
      readln (answer);
      if (answer = 'y') or (answer = 'Y')
      then
      quest := quest^.next
     end; { delete }

  begin (* delete quest *)
   writeln;
   write ('Enter the number of the question to be deleted: ');
   readln (q_num);
   temp_q := head_list;
   convert (q_num,q_key);
   (* check if first question *)
   if (q_key = temp_q^.key)
   then
   delete (head_list)
   else
    begin

     { Find the question in the linked list }

     while (temp_q^.next^.next <> nil) and
     (q_key <> temp_q^.next^.key) do
     temp_q := temp_q^.next;
     if (q key = temp_q^.next^.key)
     then
     delete (temp_q^.next)
     else
     writeln ('Question ',q_key,' not found.')
    end
 end; (* delete quest *)

procedure get_num(var key : key_type;var num : integer);
```

```
    { This routine receives an array [1..4] of digits
     and converts it into an integer number.
     }

  var
    i : integer;

   begin { get_num }
    num := 0;
    for i := 1 to key_length do
    num := num * 10 + (ord(key[i]) - ord('0'))
   end; { get_num }

  procedure add_quest (var head_list : quest_list);

    {This procedure allows the user to add a question to the
     question list.  The routine will add the question to the
     end of the question list.
     }

  var
    temp_q : quest_list;
    q_num : integer;

   begin { add_quest }
    writeln;
    writeln ('The question that is to be added has to be in');
    writeln ('two parts of 43 characters (or less) each.');
    writeln;

    (* find the end of the list *)

    temp_q := head_list;
    while (temp_q^.next <> nil) do
    temp_q := temp_q^.next;

    { get last question number from list }

    get_num (temp_q^.key,q_num);
    q_num := q_num + 1;

    { Enter in new question }

    new (temp_q^.next);
    temp_q := temp_q^.next;
    temp_q^.next := nil;
    convert (q_num,temp_q^.key);
    writeln ('Enter the first half of the question.     |(43 char)');
    get_string(temp_q^.quest1_string);
    writeln;
    writeln ('Enter the second half of the question.    |(43 char)');
```

```
    get_string (temp_q^.quest2_string);
    writeln;
    writeln ('Question ',temp_q^.key,' created')
   end; (* add quest *)

 procedure print_quest (var head_list : quest_list);

    { This procedure writed all of the questions in the data
     base to a file 'QUEST.DTA'.  The routine writes a header at
     the top of the page and draws lines inbetween questions.
     }

 var
    temp_q : quest_list;
    line_count : integer;

  begin { print_quest }
   writeln;
   writeln ('Output file is quest.rpt');
   rewrite ( outfile,'quest.rpt');
   temp_q := head_list;
   line_count := 0;
   while (temp_q <> nil) do
    begin

     { check to see if a new page is needed }

     if (line_count mod 28) = 0
     then
      begin
       if (line_count <> 0)
       then page (outfile);
       writeln (outfile);
       writeln (outfile,' key',' ':30,'Question');
       line(91,'*',outfile);
       writeln (outfile);
       writeln (outfile)
      end;
     with temp_q^ do
      begin
       write (outfile,' ',key,' ',quest1_string);
       writeln (outfile,quest2_string);
       writeln (outfile)
      end;
     line_count := line_count + 1;
     temp_q := temp_q^.next
    end
 end; (* print quest *)

procedure add_stan_forms (var head_list : form_ptr);
```

```
    { This procedure allows the user to add a new standard form
      to the standard form data base. The routine displays the new
      standard form number and prompts the user for entry of the
      question numbers for a standard form. The user may type at
      most 23 questions for a standard form. If the standard form
      is to contain less than 23 questions the user may type a zero
      for the last question number and the rest of the standard
      form question numbers will be filled in with zeros.
      }
  var
    temp_f_ptr : form_ptr;
    i, quest_num, form_num, num_of_quest : integer;

    procedure init_quest_array (var quest : form_ptr);

      { This procedure initializes the array of standard
        form numbers to be all zeros.
        }

    var
      i : integer;

     begin { init_quest_array }
      for i := 1 to max_quest_nums do
      quest^.quest_nums[i] := '0000'
     end; { init_quest_array}

    procedure char_to_dig (var num : integer; var key : key_type);

     { This procedure receives an array [1..4] of digits and
       converts them into an integer number.
       }

    var
      i : integer;

     begin { char_to_dig }
      num := 0;
      for i := 1 to key_length do
      num := num * 10 + (ord(key[i]) - ord('0'))
     end; {char_to_dig }

  begin { add_stan_forms }
   temp_f_ptr := head_list;

   { get last form number }
   if (temp_f_ptr^.form_num <> '0000')
   then
    begin
     while (temp_f_ptr^.next <> nil) do
     temp_f_ptr := temp_f_ptr^.next;
```

```
      char_to_dig (form_num,temp_f_ptr^.form_num);

      { Get new form number }

      form_num := form_num + 1;
      new (temp_f_ptr^.next);
      temp_f_ptr := temp_f_ptr^.next;
      temp_f_ptr^.next := nil;
      convert (form_num,temp_f_ptr^.form_num)
     end
    else
     begin { There are no standard forms }
      form_num := 1;
      convert (form_num,temp_f_ptr^.form_num)
     end;
    writeln;
    writeln ('Enter the question numbers for standard form');
    writeln ('number',form_num:5,'.  If you have fewer than');
    writeln ('23 questions type a ,0, as the final question ');
    writeln ('number to stop.');
    writeln;
    num_of_quest := 1;
    quest_num := 1;
    init_quest_array (temp_f_ptr);

    { Read in the questions for the new standard form }

    while (quest_num <> 0) and
    (num_of_quest <= max_quest_nums) do
     begin
      write ('Enter the number of question',num_of_quest:3,' :');
      readln (quest_num);
      convert (quest_num,temp_f_ptr^.quest_nums[num_of_quest]);
      writeln;
      num_of_quest := num_of_quest + 1
     end;
  end; { add_stan_forms }

procedure print_stand_forms (var stan_form : form_ptr);

   {  This procedure uses the question numbers in the standard
    forms to obtain the questions from the question list.  The
    routine will write out the questions for the standard
    questionnaire forms.
    }
var
   temp_f_ptr : form_ptr;
   temp_q : quest_list;
   key : key_type;
   i : integer;
```

```
begin { print_stand_forms }
 writeln;
 writeln ('Output file is stan.rpt');
 rewrite (forms_output,'stan.rpt');
 temp_f_ptr := stan_form;
 while (temp_f_ptr <> nil) do
  begin
   { print form heading }
   writeln (forms_output);
   writeln (forms_output);
   write (forms_output,'Standard form number: ');
   writeln (forms_output,temp_f_ptr^.form_num);
   writeln (forms_output);
   write (forms_output,'This form will contain the general');
   writeln (forms_output,' questions and the following ');
   writeln (forms_output,'questions.');
   writeln (forms_output,);
   line (75,'*',forms_output);
   writeln (forms_output);
   writeln (forms_output);

   { print the questions for the given form }

   for i := 1 to max_quest_nums do
    begin
     temp_q := head_list;
     key := temp_f_ptr^.quest_nums[i];
     if (key <> '0000')
     then
      begin
       { find the question }
       while (key <> temp_q^.key) and
       (temp_q^.next <> nil) do
       temp_q := temp_q^.next;
       if (temp_q^.key <> key) and (temp_q^.next = nil)
       then
       writeln ('Question ',key,' not found')
       else
        begin
         writeln (forms_output,i:3,'. ',temp_q^.quest1_string);
         write (forms_output,' ':5,temp_q^.quest2_string);
         write (forms_output,chr(13));
         line (75,'_',forms_output);
         writeln (forms_output)
        end
      end
    end; { print a single form }
   page (forms_output);
   temp_f_ptr := temp_f_ptr^.next
  end
end; {print_standard_form }
```

```
procedure delete_stan_forms(var head_list : form_ptr);

  { This procedure allows the user to delete a standard form.
   The routine is passed a pointer to the beginning of the
   standard form list. Ther user then enters the number of the
   standard form to be deleted. The user has the option of
   deleting the standard form or returning to the main routine.
   }

var
  temp_f_ptr : form_ptr;
  f_num : integer;
  f_key : key_type;

  procedure d_form(var form : form_ptr);

    { This procedure will display the question numbers in the
     standard form to be deleted. The user then has the option
     of deleting the form or returning to the main routine.
     }

  var
    answer : char;
    i,offset,half_quests : integer;

   begin (* d_form *)
    writeln;

    { Compute the first half of question numbers to
     be displayed. }

    offset := (max_quest_nums div 2) + max_quest_nums mod 2;
    half_quests := max_quest_nums div 2;

    { Display the question numbers in two columns. }

    with form^ do
     begin
      for i := 1 to half_quests do
       begin
        write (' ',i:2,') ',quest_nums[i]);
        writeln (' ':10,i+offset:2,') ',quest_nums[i+offset]);
       end;
      if odd(max_quest_nums)
      then
      writeln (' ',half_quests+1:2,') ',quest_nums[half_quests+1])
     end;
    writeln;
    write ('Do you wish to delete this form? (Y or N) ');
    readln (answer);
```

```
    if (answer = 'y') or (answer = 'Y')
    then
    form := form^.next
   end; (* d_form *)

 begin (* delete form *)
  writeln;
  write ('Enter the number of the form to be deleted: ');
  readln (f_num);
  temp_f_ptr := head_list;
  convert (f_num,f_key);
  (* check if first form *)
  if (f_key = temp_f_ptr^.form_num)
  then
  d_form (head_list)
  else
   begin

    { Find the form that is to be deleted. }

    while (temp_f_ptr^.next^.next <> nil) and
    (f_key <> temp_f_ptr^.next^.form_num) do
    temp_f_ptr := temp_f_ptr^.next;
    if (f_key = temp_f_ptr^.next^.form_num)
    then
    d_form (temp_f_ptr^.next)
    else
    writeln ('form ',f_key,' not found.')
   end
 end; (* delete form *)

procedure dump_question_list (var head_list : quest_list);

  { This procedure writes the updated version of the question
   list to a file 'QUEST.DTA'. The file will overwrite the
   old version of the question file.
   }

var
  temp_q : quest_list;

 begin { dump_question_list }
  rewrite (quest_outfile,'quest.dta');
  temp_q := head_list;
  while (temp_q <> nil) do
   begin
    write (quest_outfile,temp_q^.key,temp_q^.quest1_string);
    writeln (quest_outfile,temp_q^.quest2_string);
    temp_q := temp_q^.next
   end
 end; { dump_question_list }
```

```
procedure dump_standard_forms (var head_form : form_ptr);

  { This procedure will write the updated version of the
    standard forms to a file 'STAN.FRM'. The procedure will
    overwrite the old version of the file.
    }

var
  temp_f_ptr : form_ptr;
  i : integer;

 begin { dump_standard_forms }
  { rewrite the standard form file }
  rewrite (form_file,'stan.frm');
  temp_f_ptr := head_form;
  while (temp_f_ptr <> nil) do
   begin
    write (form_file,temp_f_ptr ^.form_num);
    for i := 1 to max_quest_nums do
    write (form_file,temp_f_ptr^.quest_nums[i]);
    writeln (form_file);
    temp_f_ptr := temp_f_ptr^.next
   end
 end; { dump_standard_forms }

procedure heading;

  { This procedure will display the heading to the
    question maintainance program and the menu of options
    that can be performed on the question and standard forms
    file.
    }

 begin { heading }
  writeln;
  writeln ('This program modifies the list of questions for the');
  write ('ICES system. This program contains the following');
  writeln (' options:');
  writeln ('     1) M - Multiple question modification');
  writeln ('     2) S - Single question modification');
  writeln ('     3) D - Deletion of a question');
  writeln ('     4) A - Adding a question');
  writeln ('     5) P - Create a printable question list');
  writeln ('     6) N - Add standard form numbers');
  writeln ('     7) X - Delete a standard form');
  writeln ('     8) L - List standard forms');
  writeln ('     9) ? - Prints this menu');
  writeln;
  writeln ('The maximum size of a question is 86 characters.');
  writeln
```

```
   end; (* heading *)

 begin (* main *)

  build_question_list (head_list);
  get_forms (stan_forms);
  heading;

   repeat (* until you want to stop *)
    write ('Enter option : (M,S,D,A,P,N,X,L,?) ');
    readln (option);
     case option of
      'm','M' :
            mult_quest (head_list);
      's','S' :
            single_quest (head_list);
      'd','D' :
            delete_quest (head_list);
      'a','A' :
            add_quest (head_list);
      'p','P' :
            print_quest (head_list);
      'n','N' :
            add_stan_forms (stan_forms);
      'x','X' :
            delete_stan_forms (stan_forms);
      'l','L' :
            print_stand_forms (stan_forms);
      '?' :
            heading;
     others :
            begin
             writeln;
             writeln ('Invalid command')
            end
    end; (* case *)
   writeln;
   write ('Do you want to continue? (Y or N) ');
   readln (option)
  until (option = 'n') or (option = 'N');

  dump_question_list (head_list);
  dump_standard_forms (stan_forms)
 end.
(* main *)
```

```
program edit_stats;

{  Written by: Peter Weiler
   For : Faculty Evaluation System
   Date last revised: May, 1983

   This program was added to the system to allow the user
   to edit the header records in the statistics files.
   The data entry personal where creating a large number
   errors in procducing header cards.  This progam allows
   the user to change the header card values.  Previously
   the user would have to reenter all of the cards
   for the instructor.

   The statistics file is in the following format:

   A header record containing:
   Department number : field (1 - 3)
   Course number     : field (4 - 6)
   Section number    : field (7 - 9)

   The data records contain seven real numbers.  The first
   five are the frequency of question answers.  The sixth
   number is the mean of the answers.  The last position
   is the standard deviation of the question answers.

   All of the statistics files are in a subdirectory with
   the logical name 'STS:'.  The file names are 'INnnnn.DTA'
   where ,nnnn, is a number in the range (0000 - 9999).
   }

const
  num_length = 3;


type

  num_type = packed array [1..3] of char;

  header_type = record
                  dept_code : num_type;
                  course_num : num_type;
                  sect_num :  num_type
                end;


  (* The stats record is the structure generated by the stats
   program. This is the structure of the information that
   follows the header card. *)

  stat_ptr = ^stats_type;
```

```
  stats_type = record
                 freq1,freq2,freq3,freq4,freq5 : integer;
                 mean,stand_dev : real;
                 next : stat_ptr
               end;

var
  stats : text;
  header : header_type;
  head_stat : stat_ptr;
  in_string : packed array [1..14] of char;
  num : integer;
  question : char;

  procedure read_stats (var header : header_type;
                        var head_stat : stat_ptr);

    { This procedure will read in the information from the
     statistics file. The header record is read into a record
     and the statistics are read into a linked list.
    }

  var
    temp_stat : stat_ptr;

   begin {read_stats}
    with header do
    readln (stats,dept_code,course_num,sect_num);
    new (head_stat);
    temp_stat := head_stat;
    with head_stat^ do
     begin
      read (stats,freq1,freq2,freq3,freq4,freq5);
      readln (stats,mean,stand_dev)
     end;
    while not eof (stats) do
     begin
      new (temp_stat^.next);
      temp_stat := temp_stat^.next;
      with temp_stat^ do
       begin
        read (stats,freq1,freq2,freq3,freq4,freq5);
        readln (stats,mean,stand_dev)
       end
     end;
    temp_stat^.next := nil
   end; {read_stats}

  procedure convert3 (num : integer; var letters : num_type);
```

```
    { This procedure will convert an integer number into
     an array [1..3] of digits.
     }

  var
    i : integer;

   begin { convert3 }
    for i := num_length downto 1 do
     begin
      letters[i] := chr((num mod 10) + ord('0'));
      num := num div 10
     end
  end; (* convert3 *)

  procedure get_num (var num : integer);

    { This procedure will read in digits from a terminal
     and create an integer number.  The routine checks to
     see that only valid digits are entered (0 - 9).  If
     an invalid character is entered the procedure will print
     an error message and have the user reenter the number.
     }

  var
    correct : boolean;
    ch : char;

   begin { get_num }
     repeat { until correct }
      correct := true;
      num := 0;
       repeat { until wrong or eoln }
        ch := input^;
        get (input);
        if (ch >= '0') and (ch <= '9')
        then
        num := num * 10 + (ord(ch) - ord('0'))
        else
         begin
          correct := false;
          readln;
          write ('invalid number reenter: ')
         end
       until (eoln or not correct);
      if correct
      then
      readln
    until correct
  end; { get_num }
```

```
procedure get_file (file_number : integer;var temp_file : text);

  (* This procedure will get an input stats file.  The number
   that is passed to it is the number of the file. *)


 begin { get_file }
  in_string := 'sts:IN0000.DTA';
  in_string[7] := chr(file_number div 1000 + ord('0'));
  in_string[8] := chr((file_number div 100) mod 10 + ord('0'));
  in_string[9] := chr((file_number div 10) mod 10 + ord('0'));
  in_string[10] := chr(file_number mod 10 + ord('0'));
  reset (temp_file,in_string)
 end; (* get file *)

procedure write_stats ( var header : header_type;
                        var head_stat : stat_ptr);

  {  This procedure will write the updated information back
   to the original statistics file.  The old statistics file
   is deleted in the process.
   }

var
  temp_stats : stat_ptr;

 begin { write_stats }
  rewrite (stats,in_string);
  with header do
  writeln (stats,dept_code,course_num,sect_num);
  temp_stats := head_stat;
  while (temp_stats <> nil) do
   begin
    with temp_stats^ do
     begin
      write ( stats,freq1:4,freq2:4,freq3:4,freq4:4,freq5:4);
      writeln (stats,mean:10:5,stand_dev:10:3)
     end;
    temp_stats := temp_stats^.next
   end
 end; { write_stats }

procedure edit_stats ( var header : header_type);

  {  This procedure displays the header record and asks the user
   if it is to be changed.  The user has the option of changing
   the header record or returning to the main routine.  The
   header record is displayed again after the change has been
   made.
   }
```

```
  var
    answer : char;
    num : integer;

   begin { edit_stats }
     repeat { until info correct }
      writeln;
      writeln ('Department number = ',header.dept_code);
      writeln ('Course number     = ',header.course_num);
      writeln ('Section number    = ',header.sect_num);
      writeln;
      write ('Do you wish to change the information? (Y/N) ');
      readln (answer);
      writeln;
      if (answer = 'Y') or (answer = 'y')
      then
       begin
        write ('Enter the dept. no.     : ');
        get_num (num);
        convert3 (num,header.dept_code);
        write ('Enter the course number : ');
        get_num (num);
        convert3 (num,header.course_num);
        write ('Enter the section number: ');
        get_num (num);
        convert3 (num,header.sect_num);
       end
     until (answer <> 'y') and (answer <> 'Y')
   end; { edit_stats }

begin { main }
 writeln;
 writeln ('This routine allows the user to edit the header');
 writeln ('record of the statistics file.');
  repeat { until done }
   writeln;
   write ('Enter the statistics file number: ');
   get_num (num);
   get_file (num,stats);
   if eof (stats)
   then
   writeln ('The file is empty enter a different number.')
   else
    begin
     read_stats (header,head_stat);
     edit_stats (header);
     write_stats (header,head_stat)
    end;
   write ('If you have another entry type ,c, to continue. ');
   readln (question)
```

```
   until (question <> 'c') and (question <> 'C')
 end.
{ main }
```